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EDITORIAL NOTES.

First Effects of the War on the Gas Light and Coke Company.

WHEN Sir Corbet Woodall addressed the proprietors of the Gas Light and Coke Company three days after this country declared war against Germany, neither he nor anyone else could tell what the future had in store. But thus early he made the cautious observation: "Estimates, under "the present circumstances of the country, are of little (if "any) value. Otherwise I should have said that we could "afford to reduce our liquid assets by a quarter of a mil-"lion before contemplating an increase in the price of gas." Within two months of the time of that utterance, the price of gas was raised by the Company by 2d. per 1000 cubic feet. Although this advance for the last three months of the half year probably represents a sum in the neighbourhood of £50,000, and although the consequential reduction of the dividend from £4 17s. 4d. to £4 13s. 4d. means a saving of £17,074 (the dividend payment at the reduced rate for the half year being £381,668 on £16,357,205 of capital), it is seen that the balance brought forward from the half year (£384,538) is £150,776 less than the sum brought into it. In other words, the amount of the profit balance, £230,892 on the half-year's operations (after providing for fixed charges and setting aside £10,000 to the redemption fund), is £150,776 short of the sum needed for the dividend. Had it not been for the additional revenue derived from the increase in the price of gas, and the smaller sum required for dividend, the Company would already have approached very near the limit of the safe reduction of liquid assets spoken of by Sir Corbet. The increase in the price—regrettable as it is to a Board who have, by the aid of officers, staffs, and men, made during late years an unbroken succession of reductions in price, and at the same time have created a degree of financial stability not enjoyed by the huge undertaking for many a long year—was an imperative step. Its prudence is felt still more in the present critical times through which London is passing in regard to coal deliveries, high freights, and congested railway traffic. In these and other respects, the future is as impenetrable to-day as it was last August.

There is not the slightest use in comparing the trading results of the past half year under war conditions with the accounts for a half year when fairly normal conditions prevailed. The shattered accounts for the last six months are not comparable with any half year; and whatever comparisons are instituted only show the effects of strange and exceptional conditions when brought into contrast with a half year more or less normal, save in respect of dear coal and irregular movements of the residuals markets. It is seen that for the Gas Light and Coke Company, as for other gas undertakings, residuals have been the nightmare of the half year; for although the sales of gas showed a decrease of 4¾ per cent., the adverse financial result in this regard, with the 2d. extra on the price in the second three months, was relatively insignificant. This result in the matter of consumption, the Directors say in their report, was brought about by the police regulations for the earlier closing of licensed premises and the restriction of outdoor lighting under the Defence of the Realm Act. What does the 4¾ per cent. mean in round figures? The total quantity of gas sold during the half year was 12,727,041,000 cubic feet —a reduction of 630,712,000 cubic feet in comparison with the December half of 1913. This diminution was distributed between private meters (domestic, industrial, and shop purposes) as to 539,344,000 cubic feet, and public lighting as to 91,368,000 cubic feet—the total consumption for private purposes having been 12,348,056,000 cubic feet, and for public lighting 378,985,000 cubic feet. Owing to the quarter's increase in price to private consumers, the total revenue for gas (£1,620,275) was only down £16,095, of which no less than £12,726 was for public lighting in respect of the allowances made for the lower consumption in the attempt to obscure the streets from the eyes of nocturnal aërial navigators. Had it not been, however, for the 2d. advance in price, the £3369 reduction in the income from private gas consumers would no doubt have been something like £50,000 odd.

But the market for residuals broke down completely through causes that are too well known in the industry to require even the barest mention here. The total revenue of the Company from this source fell headlong from the height of £591,490 in the December half of 1913 to £398,045 in the past half year—a drop of no less than £193,445. This is where the half-year's financial record came to grief. Coke, producing only £243,492, was a worse contributor to income by £118,817. This is a solid sum; and it tells a tale of the deplorable state that the coke market has been in when it is seen that there were only some 20,491 tons less sold in the half year than in the corresponding one. Breeze yielded £15,479 less; tar and tar products, £21,313 less; and ammoniacal liquor and sulphate of ammonia, £37,838 less. In view of the pressure in the coal market, coke has been going off better during the first weeks of this year; and, faced by the serious coal trouble, carburetted water gas is being sent out at increased percentage, so as to conserve coal stocks as much as possible. Though it is unsafe to predict even from day to day under present circumstances, or to build up too much confidence as to the future in the matter of trade till peace releases the country and the world from the terrible obsession of war, one may be pardoned for looking more hopefully to a brightening of the residuals record for the current half year. At the end of the past half year, the quantity of coke the Company had in store was 61,694 tons, compared with the 114,705 tons brought into the half year. But 90,155 tons less were made. Naturally, owing to the smaller quantity of coal carbonized through the reduced demand for gas, and the greater quantity of carburetted water gas made, there was diminished production of residuals all through. There were 12,182 tons less breeze made, 1,135,938 gallons less tar, and 64,282 butts less ammoniacal liquor. It is seen from these figures that there is nothing tangible upon which to go in making a trading comparison.

This sheer fall in the income from residuals had a disastrous effect upon the net cost of raw materials, more particularly in view of the lower quantity of gas required; the total production being 13,813,324,000 cubic feet, or a reduction of 712,374,000 cubic feet. Of the total make of gas, 3,670,865,000 cubic feet were carburetted water gas, which was an increase, compared with the second half of 1913, of 825,587,000 cubic feet. The quantity of coal gas made last half year was 10,142,459,000 cubic feet. With the recession in demand, and the larger proportion of carburetted water gas made, the amount of coal carbonized fell to 816,652 tons, being a reduction of 132,487 tons; but there was an increase by 1,697,148 gallons in the quantity of oil used in the half year (8,304,525 gallons). In regard to the expenditure on coal, there was the reduction of 132,487 tons in the quantity carbonized; and, during the half year (not for its full duration), the new coal contracts came into force, which gave an average reduction of 2s. per ton compared with the previous contracts. Through these variations, the outlay on coal (totalling £659,523) was £123,084 less than in the corresponding half year. On the other hand, the oil used cost £100,847, as against £46,376, or an increase of £54,471, which appears to be a considerable difference in view of the fact that the extra oil consumed only amounted to 1,697,148 gallons, out of the total mentioned above. For coke and breeze used in the manufacture of water gas, £44,845 was paid, or £2101 more. This means that a total of £805,216 was paid for raw materials, or a less amount by £66,511 than in the December half of 1913. Here we see the ugly effect upon the

accounts of the residuals markets. In the second half of 1913, the raw materials used in manufacture cost £871,727, and then the residuals produced £591,490; so that the net cost of raw materials was £280,237. But in the past half year, with raw materials costing £805,216, the residuals only contributed £398,045; so that the net cost of raw materials was £407,171. In other words, the net cost of raw materials was £126,934 more, notwithstanding that 712,374,000 cubic feet less gas were made. There is some reflection in the accounts as to what is happening in connection with coal reserves. At June 30 last, the Company had in store 232,764 tons of coal, as compared with 138,839 tons at Dec. 31—a reduction of 93,925 tons. At Dec. 31, 1913, there were in store 265,692 tons, or 126,853 tons more than at Dec. 31 last. This is a matter of exceeding gravity at the present time; and it is to be hoped that the Governor will have something reassuring to say upon this head by the time he meets the proprietors next Friday.

There is really nothing of importance to which to call attention in the other items of expenditure. With smaller business, naturally most of the other manufacturing items have varied in the downward direction. The succeeding outlay on the same side of the revenue account is not much affected by the diminution of business, and so the changes on the whole are not particularly striking. But it may be mentioned, as showing that employee co-partners, as well as the ordinary proprietors, are feeling the effects of the war conditions on the business, that the charge in connection with co-partnership has been reduced by £6000. On the other hand, there is an amount of £7124 representing allowances to employees on active service, in regard to whom the Board refer with some pride to the fact that they have 1700 serving the country in connection with the war.

Concerning the other side of the revenue account, reference has already been made to the receipts for gas and residual products. From between these items comes a ray of sunshine. There are placed the meter and stove rentals, which show by their enlargement that the foundation of the business continues to expand. The total, including the rental of fittings, amounted to £244,253, which is an increase of £5908. But, as a matter of fact, rental of meters and stoves advanced together by £7601; and this was reduced by £1693 less being contributed by the rental of fittings. In their report, the Directors give further indication of the excellent expansion that is going on in this respect. An increase of 9533 took place in the half year in the number of consumers connected, and of 30,427 in the number of gas-stoves sold and let on hire. Another excellent feature is in connection with the working. The make of gas per ton of coal carbonized was 12,419 cubic feet, as compared with 12,367 cubic feet in the June half year, and 12,306 cubic feet in the second half of 1913. The quantity of oil used per 1000 cubic feet of carburetted water gas made was 2·26 gallons.

To sum up the revenue account results, the total expenditure (£1,819,163) shows a reduction of £130,147; and the total income (£2,268,673) exhibits a decline of £203,347. Deducting from the last figure the reduction of expenditure, we have the £73,200 by which the amount carried to net revenue account (£449,509) is less than the sum transferred a year ago, when, owing to dear coal and oil, and mild weather interfering with the sales of gas and coke, some £96,499 had to be taken from the undivided balance. When the circumstances of the past half year are considered in all their fullness, there is nothing to be much surprised at in the financial result. Expectations indeed might have gone, justified by the conditions, to even a greater length. We know the worst now. The anxiety to-day is as to the future. There is better hope for residuals, and oil has been coming into the country in good quantity. But coal and freights—what of them? What, too, of forced economies owing to the rise in the prices of commodities of all kinds?

South Metropolitan Experiences under War Conditions.

THE experiences of the South Metropolitan Gas Company, being straight coal-gas purveyors on the large scale, are always of interest, and are especially so in periods when the coke market is not in genial mood, with no water-gas plant available to help to absorb production. The interest on this occasion is heightened by the extraordinary conditions produced by the war; and it will be more so at the close of the current half year when one is enabled to see the effect of the imposition in the way of freightage which is at the present time ruling for the transfer of coal from the Tyne to London—depending, as the Company do, on coal alone for manufacturing material. In addition to their shipping contracts, the Company will, we take it, have to seek aid from steamers at the higher rates of freightage, seeing that the longest paragraph in the Directors' report (signed by the Chairman, Mr. Charles Carpenter, D.Sc.) for the past half year constitutes a strong protest against the action of the Government in acquiescing to a charge of 13s. 6d. (now 11s.) per ton being paid for the use of interned steamers, chartered through their agents, in lieu of those commandeered for Navy purposes. We wholly sympathize with the protest. It is altogether unjust, in view of the fact that "current contracts, which were originally made "at 3s. per ton, have been mutually increased to 5s. "to cover the reduced earning capacity of the steamers, "higher wages, and insurance for war risk." But while it is quite true that the additional freightage per ton named in the report means "a burden, amounting to about 9d. "per 1000 cubic feet of gas, upon the people of London, "most of whom belong to the poorer classes, which is unfair "in the extreme," the 9d. will not apply to coal brought to London under contract at 5s.; so that it is not an average figure. However, the action of the Government is a matter both immediately and prospectively serious for all large coal consumers, inasmuch as their action is, and will be, an incentive to the shipowners to maintain at a high figure their rates other than those by contract; and so, if the war continues for any lengthened period, the Government will find themselves in the invidious position of having assisted the shipowners to secure excessive profits out of the abnormal circumstances created by the war. If a fair price is 5s. under present conditions, then the additional tonnage provided by the Government, by means of interned ships, ought to have had the effect of discountenancing—not supporting—an unjustifiable addition to it. The appeals of the Government to patriotism, and their very proper boast of the guardianship of our Navy, find a somewhat mocking echo in the assistance they are rendering, by their acquiescent attitude towards exorbitant freightages in respect of the country's commerce. However, it will be of interest six months hence to see what has been the effect of the Government's action on the average costs of the all-coal-gas Company, in comparison with concerns which will be able to spread the additional cost over their combined coal-gas and water-gas output.

Turning to last half-year's accounts, as we have said in the case of the Gas Light and Coke Company, so we say here, there is no value in making comparison of the items other than to obtain information as to the effects on the trading of the adverse conditions that have operated and are largely the outcome of the war. At once we say the proprietors may be congratulated upon the showing of the accounts; for, in the financial result, they are really better than certain of their predecessors have been under other circumstances. There has been a heavy fall in income from residuals; but two-thirds of the fall is the equivalent of the amount by which the coal bill is less than in the corresponding half year. Gas consumption, however, slipped back by 4·29 per cent., though, through the 2d. increase in price (making it 2s. 4d.) during the past quarter, the gas receipts were actually greater last half year than in the corresponding one of 1913. Further, though, in the final result, the total receipts were considerably lessened, the total expenditure, principally through coal and the repair and renewal items, was lowered to a larger extent, and so the amount transferred to the net revenue account is larger by £27,523 than in the second half of 1913. The Directors are therefore (by the aid of the £26,748 brought forward) able to pay the statutory dividend (reduced from £5 9s. 4d. by reason of the rise in the price of gas) of £5 4s., and still have £1202 to carry forward, without trespassing on the reserve fund of nearly £200,000, of which close upon £150,000 is invested. In other words, whatever may be in store—and there is a good deal of anxiety current and prospective for the Directors of the Company as for other gas administrators—the Company start the present half year with a clean financial sheet.

This is the general position; and into it we may dip for a little more detail. The quantity of coal carbonized was 545,476 tons—a smaller amount by 12,077 tons than in the second half of 1913. The total cost for coal was £403,573; being less by £62,517 than in the second half of 1913. The figures as to lessened quantity and money saving show the

beneficial effect of such reduction as was obtained in the coal contract price last spring. It may be mentioned that from the amount of coal carbonized 6,880,774,000 cubic feet of gas were made, or an average per ton of 12,614 cubic feet, compared with 12,476 cubic feet in the preceding half year, and 12,734 cubic feet in the corresponding half year. The retort-house working has therefore been on the usual excellent lines. Residual products were the bane of the half year, for—due more to the state of the markets than to the somewhat smaller quantity produced—the income of £237,318 from this quarter was worse by £91,667; this sum being constituted of a lessened inflow from coke of £48,235, from breeze of £3525, from tar and tar products of £24,586, and from sulphate of ammonia of £15,321. This reduction meant that whereas, paying £466,090 for coal in the second half of 1913, and receiving £328,985 for residuals, the net cost of coal was £137,105, last half year, paying £403,573 for coal, and receiving £237,318 for residuals, the net cost was £166,255, or £29,150 more, notwithstanding the reduction by 12,077 tons in the quantity carbonized, and the lower prices paid under the new contracts for part of the six months. The result of this is that the net cost of coal represented last half year 5·8d. per 1000 cubic feet of gas made, as compared with 4·63d. in the December half of the preceding year (which compared with previous figures was high), or an increase of 1·16d., which, added to the other factors operating against the half year, supplies a complete justification for the addition of 2d. to the price of gas. Even though coke and sulphate of ammonia, partly through circumstances associated with the war, have now had their values raised, the Directors are minded not to inspire any false hopes as to the future—the future being shrouded in the darkest uncertainty—for they merely remark in their report: "The price of resi- "duals during the half year has been unsatisfactory. The "markets for coke and ammonia, however, show some signs "of recovery, but tar has been affected owing to the dis- "turbance by the war of the shipment of pitch for briquette "making." Before leaving coal and residuals, it is noted that the Company did not, relatively considered, end up the half year in at all a bad position regarding coal and coke. They began it with 181,056 tons of coal in store, and ended it with 189,837 tons in hand, which was also 2676 tons better than at Dec. 31, 1913. The recent history of coke stocks is also interesting, as it discloses a better position at Dec. 31 last than since they began to creep up in the second half of 1913. At June 30 of that year, the stock was 20,876 tons, by Dec. 31 it had grown to 70,037 tons, at June 30 last it had further enlarged its bulk to 105,746 tons, but at Dec. 31 last it was down to about half the quantity—52,205 tons; and by this time a further shrinkage has no doubt taken place. The quantity of coke made last half year was only some 8173 tons less than in the corresponding period of 1913.

Coming now to the effect upon the sales of gas of the conditions ruling in London. The percentage set-back in the half year was 4·29, which the Directors do not, under the circumstances, consider disappointing. As a matter of fact, we are pleasantly astonished, as they must be, that things have not been worse. The Board remark that "the "loss is not surprising when the diminution of the hours of "lighting and the reduction of the amount of light permitted "are considered"—to be rather more correct, the "small- "ness" of the amount of light "permitted." Translating the percentage to volume, the reduction in the sales of gas amounted to 284,425,000 cubic feet—the total consumption having been 6,347,608,000 cubic feet. Of the reduction, 248,114,000 cubic feet were due to private business, and 36,311,000 feet to public lighting. But despite the diminution, the raising of the price by 2d. (to 2s. 4d.) to private consumers in the second quarter gave the Company a total income from gas of £699,469, which was greater by £9110 than in the corresponding half year. The actual increase in revenue from private consumption was £11,888, with a total of £684,952; but through the dimming and the extinguishing of the street lights at night-time, the £14,517 paid for the public service was £2778 less than in the corresponding half year. As a matter of fact, in the first three of the six months, the Company, receiving their £276,647 from private consumers, fell behind from this source by £2307; but, in the Christmas quarter, with the 2d. extra in force, the £408,304 received exceeded by £14,195 the private gas income of the same quarter of 1913. In the circumstances, the position is by no means unsatisfactory in regard to gas; and still less so is it when one, considering the future, finds that (though the 95,435 ordinary meters in use mean a disconnection of 319) the slot meter connections have been raised by 5190 to 275,111, the ordinary stove connections by 1120 to 83,927, the slot stove connections by 5414 to 228,902, and fires on rental (which do not include the enormous number of privately owned ones) by 5470 to 50,010. The scope of the business is indeed expanding at a gratifying rate.

No particular purpose would be served by, on this occasion, making comparison of the other items in the revenue account. But in passing, we see a pleasing charge, "Em- "ployees' reservists' fund, £3207," and, turning to the Directors' report, we learn that of the Company's staff 32 per cent., and of the workmen 22 per cent.—making together 1470 men—are now serving with His Majesty's forces. To sum up, the expenditure of the half year came to £885,634, or £111,033 less than in the second half of 1913. The total receipts were £1,065,619, or a reduction of £83,511; so that, as stated earlier in the article, on balance the amount transferred to the net revenue account (£179,985) is better by £27,523. Therefore, all things considered, our view that there is cause, in the result and under the circumstances, for congratulation is, we feel, abundantly justified.

Gas Coal Supplies and Freights.

THE difficulty of obtaining deliveries of coal appears to be general throughout the country; and most of the responsible men directing the affairs of gas undertakings are looking to the future with gloomy apprehension, with before them diminishing stocks, and sluggish incoming of supplies. In London, as was seen in the "JOURNAL" last week, a Committee composed of representatives of the principal users and merchants (known as the London Coal Supply Advisory Committee, with Mr. D. Milne Watson at the head) are energetically doing all they can to improve the position in London and the neighbourhood. The most acute difficulty in the Metropolitan area has been that of transport, both by sea and rail, combined with the heavy costs that have been occasioned. Other parts of the country (and this would equally apply to London and the South) allege shortage of coal supply at the pits, on account of the reduction of hands through the number of men who have joined the Colours, as an additional cause of the grave situation that has arisen. But in this regard it is contended by a representative labour organ that whatever shortage of labour exists is about counterbalanced by the reduction that has taken place in the export of coal. However, that is not the view held in other quarters. It is not the one entertained by the representatives of Scotch gas undertakings who, as stated in our "War Notes" last week, held a conference on the subject of the shortage in supply and delivery, and passed a resolution urging the Government to, under section 4, suspend the Eight Hours Act for Miners in order to relieve the present very serious deficiency. Anxiety in the matter of deliveries is likewise keen in the Manchester district; and as will be observed by one of the "War Notes" this week, Mr. William Kay, the Chairman of the Manchester Corporation Gas Committee, and Alderman F. S. Phillips, the Chairman of the Salford Corporation Gas Committee, have jointly called for next Friday afternoon a conference of representatives of gas undertakings in the neighbouring areas to consider the best course to pursue to meet the difficulty. In the circular convening the conference, both Mr. Kay and Alderman Phillips indicate that their opinion harmonizes with that of the representatives of Scottish gas undertakings, that probably the best course would be to get the Government to suspend the operation of the Eight Hours Act. Transport facilities would have to be considerably improved, if supplies at the pits were larger.

Regarding the question of freights, the 13s. 6d. per ton to which reference was made last week as the charge from the Tyne to London that the Government were making (being the then market rate) for the use of detained German ships, has been reduced to 11s. per ton—this being in contrast with the 3s. or 4s. ruling prior to the war; and it is still about 6s. more than some people think it ought to be. The gas companies in this matter are charged with wanting preferential consideration. This is a mistake. The Advisory Committee representing the large coal buyers in London, as was pointed out last week, is comprehensive of all the interests concerned, and not of the Gas Companies alone. It should not be forgotten, too, that one cause of the present

difficulty is the commandeering of ships by the Admiralty, for which ships the owners are being paid at the rate of about 4s. per ton. To replace this loss, the large coal buyers in London—the situation appears somewhat Gilbertian—are now asked by the Government to pay 11s. per ton, and a week ago 13s. 6d. This is unfair. The insistence on the high market rate is a concession to shipowners, who do not want to see their opportunity in any way impaired by the action of the Government. There is no question that the shipowners are making considerable profit out of the present conditions; and that what is called the current market rate of freights is not justified by the extra expenses to which admittedly they have been put. They do not deny that they are making profit to an extent to which they have not always been accustomed; but at the same time they do not call the present profit a "magnificent" one. Different people have different views as to what they would term "magnificent." During the past week, the shipowners made a set endeavour to justify their position; but they did not give any express data upon which to pass judgment as to the increased expenses (including those occasioned by delay) to which they are put, and which would be a legitimate charge, as would be a reasonable additional profit in view of the conditions under which their ships are being run. Some of the principal reasons which they do advance (as published last week in the daily papers) in justification of their action in raising freights to the present level, have been strongly contested from other quarters, especially the reasons having reference to labour. But the shipowners are in agreement with certain other sections of the community in the opinion that, if the Government would secure the pooling of railway trucks and carts, there would be a better transport service about the country; and there would then be less delay in distribution, as well as in the deliveries to and from the different docks. Representations to this effect have been made to the Government; and the Government have this, among other matters affecting the general question, under serious consideration.

The Relationship between Coal and Coke.

A letter which has peculiar interest at the present time comes from Mr. W. R. Herring, and is published in our "Correspondence" columns this week. It deals with the relationship between the cost per ton of coal and the price realized per ton of coke; and, using as illustration a company making straight coal gas, it statistically demonstrates that between 1899 and 1913 very close relationship did in that case exist—giving also other instructive workings bearing upon the matter, and on the proportion of the cost of coal represented by the entire receipts for residuals. The uniformity is remarkable. All gas undertakings could not show the same; and the managers might be disposed to disagree with Mr. Herring that, because they cannot show the like intimate relationship, they have been disposing of their coke at less than need be done. But we shall be curious to see what happens when Mr. Herring is in a position, as he probably is by this time, to add the line for 1914. As to his observation that "at the present time, with the cost of seaborne coal such a terrifying factor in many concerns, it is well to bear in mind that the same influences which make coal dear should enhance the value of gas-works coke, and justify its price being advanced proportionately," the statement seems to us to be too comprehensive. Its application depends largely upon the origin of the "influences" which make coal dear. If these influences are artificially born, they can hardly have substantial effect in raising the price of coke, or in "justifying its price being advanced proportionately." The recent and current heavy freightage for coal from the Tyne to London is not all justified. It makes Durham coal extraordinarily dear in London; but how can the abnormal freightage be brought in as an "influence" justifying the raising of the price of coke proportionately? A shortage of coal supply in London is a legitimate influence, and so are the normal variations in freightage. However, we shall see whether abnormal and partly artificial conditions have during 1914 resulted, and will during 1915 result, in that close relationship which, in other times and under other conditions, have existed between coal and coke.

A Glamorganshire Gas-Works Purchase.

The undertaking of the Porthcawl and District Gas Company is not very large at present; but it is precisely one of the kind of concerns with regard to whose prospects and affairs generally there is plenty of scope for argument. This, at all events, proved to be the case in connection with arbitration proceedings which have just been held in London to determine the price to be paid for the undertaking by the Urban District Council, who are acquiring it under an Act of Parliament passed last year. Porthcawl is a sea-side resort which has of recent years grown rapidly in public favour; and the Gas Company have developed along with it. In 1913, it was desired that the concern should become a statutory one, and an Act to this end was secured; but, by agreement with the Council, there was inserted in it a purchase clause. This led up to the Council's Bill the following session, by which it was provided that, in arriving at the amount to be paid for the works, no regard should be had to the fact that the Company had obtained an Act—which meant that in reality the undertaking had to be valued as a non-statutory concern. As usually happens in such cases, there was considerable divergence of opinion as to numerous matters arising out of the works and the accounts; and, in particular, a great deal of evidence was given on the contentious question of what is an adequate charge against revenue for repairs, renewals, and depreciation. But in addition to more or less familiar subjects of argument, something of a new element was introduced into these particular arbitration proceedings by the war and its influence on the money market. There was much questioning as to the effect of all that has happened, and all that is happening, and is likely to happen, on the yield to be anticipated from gas stocks; and the result was an interesting discussion on a topic which, in one form or another, is now much in the public mind. With the Hon. J. D. Fitzgerald, K.C., as Umpire, Mr. Henry Woodall and Mr. Frank H. Jones sat as Arbitrators engineering evidence being given by Mr. J. H. Brearley and Mr. Sidney E. Stevenson for the Company, and Mr. Arthur Valon and Mr. J. Ferguson Bell for the Council. From the report of the Company's case which is given on another page of this issue, it will be seen that Mr. Brearley in his valuation adopted for his multiplier 25 years' purchase, and added 5 per cent. for disturbance and re-investment; and then some figures were submitted by Mr. Stevenson. On the other hand, 16 years' purchase was the multiplier put forward by both Mr. Valon and Mr. Bell, when giving evidence as the Council's witnesses. A report of this portion of the proceedings, together with the closing speeches of Counsel, will be given next week.

Free Traders and the Aniline Dye Scheme.

Information is given in our "Miscellaneous News" columns as to the modified national aniline dye scheme, which it is hoped and believed will meet with better acceptance than the original one at the hands of certain objectors, particularly in the Yorkshire district. At any rate, it is certain now that, for good or ill, the scheme is going forward under the ægis of the Government, despite the former opposition of those Free Traders who were almost sent into convulsions by the very idea of any trade being under protection, and of those users of dyes and colours who, looking to their own personal profit, and not to the national interests, were afraid that they might lose an additional fraction of gain by anything being done to shut out Germany's dyes and colours which, in order to re-establish a footing are sure to be offered at a cheap rate, provided there is no protection for the home-producing industry, when peace is restored. To these obstructionists broad-minded Lord Rosebery gave a nasty and well-deserved knock at Edinburgh last Saturday. They are the men who have been attempting to wreck the scheme, through putting their political tenets before the material welfare of the nation. Lord Rosebery is a Free Trader of the first water; but this is what he says: "We must not allow any formula to stand between ourselves and the successful prosecution of the war—any formula consistent with honour. We are opposed by a nation which has no such saving clause as that." Again, later on, he remarked: "Suppose it were necessary to impose a hostile tariff to build-up that industry [the aniline dye industry] for a limited time, I do not suppose any Free Trader in this assembly would object to such a consummation." The remarks were lustily endorsed. The scheme, and the questions that surround it, should be broadly viewed, and not through glasses obscured by political principles and narrow prejudices. The whole point is whether the scheme will benefit or injure the arch-enemy. The two things that matter are the defeat of the enemy, and the commercial strengthening of our own country.

A "Gross" Inaccuracy.

In the trade review number of the "Engineering Supplement" of "The Times," there is an article dealing with gas affairs, in which is properly expressed a large amount of confidence as to the future of the industry. Our only object in referring to the article here is in behalf of historical accuracy. In this regard, as to one or two points, the writer of the article does not appear very well informed. He refers to the passing of the illuminating power standard in the case of the Gas Light and Coke Company, and the revision of the terms of the calorific power standard under which the great concern is now operating. In the comment on this matter, the writer shows a want of knowledge of the much that has been done in this respect in Parliament the last three sessions: He says: "A novel interest is attached to the [Gas Light] stipulations in that all figures are judged on the gross basis—*a criterion hitherto not adopted by other companies rated on calorific power*. From the point of view of both producers and consumers, the gross basis is certainly to be preferred, particularly as the net value bears no relation to 90 per cent. or more of the appliances for burning gas now in use." "A criterion hitherto *not* adopted by other companies rated on calorific power!" As a matter of fact, "gross" value was first applied in 1912, and in the case of the South Suburban Company's standard—this being one of the conditions, in addition to "B.Th.U." in place of calories, for which, we remember, the Chairman of the Company (Mr. Charles Hunt) very strongly, and successfully, contended in the negotiations that took place over the Company's Bill. Indeed, the South Suburban conditions of 1912 have formed the model up to this session for most of the calorific value applications to Parliament; and the clause in the Company's Act was the very one advanced by the Gas Light and Coke Company, in the cause of uniformity, when approaching Parliament last session. Though not adopted in its entirety, it formed the foundation for what was done in connection with that Company's Act and all the Acts depending upon the determination in the Gas Light "test case" of the question of conditions.

The Percentage Effect of Diminished Lighting.

One other point in the same article that should be corrected refers to the effect upon the gas business of the lighting restrictions now in force. The writer in "The Times" says: "As a consequence, the general reduction in lighting has, on an average, accounted for a decrease in consumption of about 8 per cent., while in many cases the falling-off has amounted to no more than 5 per cent." It is unfortunate that the public should be led to believe that the diminution of the gas business, as a result of the restrictions, is worse than it really is. We should like to know how the writer arrived at the figure of 8 per cent. as an "average," seeing that the Gas Light Company's reduction is only $4\frac{3}{4}$ per cent., and that of the South Metropolitan Company 4·29 per cent.—which percentages are not bad in the circumstances.

The Rights of Councillors.

It has already been admitted in the Law Courts that mere curiosity or desire to see and inspect documents is not sufficient to give a councillor, simply because he happens to be a councillor, a right to a roving commission to go and examine the books of a corporation; and the right to inspect any particular document would appear to be contingent upon being able to prove the existence of a *bonâ-fide* ground for wishing to see it. But in a case which has arisen at Southport, a member of the Council argued that, in accordance with the provisions of section 233 of the Municipal Corporations Act, a member of the Corporation has a statutory right to see any documents connected with the town's affairs; and from this it was inferred that any member at any time, months or years afterwards, could demand to see any document under any circumstances, and that if an official of the governing body failed to produce any document asked for by any member at any time he was failing in his duty. This, it will be seen, does not at all square with the decision of Lord Alverstone referred to above, that the showing of a *bonâ-fide* ground for wishing to see is a condition on which the bestowal of the right depends. The facts at Southport were that a demand was made by a councillor, first, for the production of some correspondence with the Local Government Board on a matter in which the Corporation and the old Birkdale Council had a dispute. Another demand was for Counsel's opinion on a matter in which the councillor making the demand "appeared to be pecuniarily interested, and in the document his name was mentioned." It is, no doubt, the fact that in the majority of cases applications for the production of such documents as are now alluded to will be made to an official of the local authority concerned; and it may be well for those who are likely to be placed in a position of doubt consequent upon such a request, to note the attitude adopted in the two cases here referred to. In the action which gave rise to Lord Alverstone's judgment [reproduced in the "Southport Guardian"], the Town Clerk of Southwold informed the applicant that he could not show him the document in question until he had taken the instructions of the Council on the matter. A similar attitude was adopted by the Town Clerk of Southport, who, when applied to, said, in effect, that he would accept the instructions of either the Council or the Committee concerned—it was for them to say what was to be done, and who should see Corporation documents. This is a course which will be likely to commend itself to others who find themselves in a like difficulty.

DEATH OF MR. JOSEPH MORRIS.

We much regret to record the death, on Monday last week, in his eighty-fifth year, of Mr. Joseph Morris, who for a period of nearly fifty years filled the position of Engineer and Manager of the Jersey Gas Company. He retired in the autumn of 1911, and an account of his life-work was given in the "Journal" at the time. He was succeeded by his son, Mr. Harry Morris, who had been for some years associated with him in the management of the Company. Mr. Morris was admitted into the British Association of Gas Managers in 1868, and passed into the Gas Institute. He was a member of the first and also of the present Institution, and until within the last few years he attended the annual meetings; but he was not known to a very large number of his professional colleagues. One of these—Mr. James W. Helps—who was a very old friend, has sent a letter to express his sorrow at learning of Mr. Morris's death; the writer's earliest memories of his connection with the gas industry being associated with him. In the course of his letter Mr. Helps says:

"Joseph Morris was one of those old-time gentlemen of our profession who are too rare to allow of their passing away without very general feelings of intense regret. He was always quietly cheerful, while the quaint humour which characterized him made his company peculiarly sought after by those who appreciated such qualities, more especially when they were combined with the single-mindedness and honesty of purpose which he possessed in so marked a degree.

"When Mr. Morris ceased to attend the annual meetings, I was far from being alone in deeply regretting his absence, and in believing that the gatherings were thereby robbed of a very pleasant personalty. To those who could claim him as a friend he was ever genial and helpful; while to those who could only count him as an acquaintance, he was always kindly and courteous.

"Since he ceased to attend the meetings, I have not seen much of him, and I often regret I was never able to accept his cordial invitations to visit him at his island home. Of late years, however, I have again had reason to appreciate the kindliness of his nature. I have before me a letter dated April 14, 1910, couched in most friendly terms, and written in answer to an inquiry I made of him respecting an advertisement for an assistant at the works under his charge, which appeared in the "Journal." My eldest son was one of the applicants, and a short time afterwards Mr. Morris was thoughtful enough to send me a telegram informing me that he had been successful. I need hardly say that until the time of Mr. Morris's retirement my son always received at his hands the most kindly consideration and assistance; and he has often told me how much he admired Mr. Morris's strict devotion to work, which he always carried out not only as if it were his duty but his hobby.

"I feel sure that all who knew Mr. Morris will wish to extend to his son and daughters their sincere and deep sympathy with them in their bereavement, and to express their belief that by his death the Island of Jersey has been robbed of one of its most esteemed and respected residents."

"Problems of Modern Illumination" will be dealt with by Mr. V. H. Mackinney at the meeting of the Institute of Sanitary Engineers at Caxton Hall, Westminster, to-morrow evening.

One of the papers announced to be read shortly before the Royal Society of Arts is by Professor Vernon Harcourt, F.R.S., "On an Economical and Smokeless Grate, and on the Measurement of the Efficiency of Open Grates." It will be of special interest in view of the remarks of Professor Lewes in his lecture on "Coke" at the recent meeting of the London and Southern District Junior Gas Association, as reported in the "Journal" last week.

THE GAS INDUSTRY AND THE WAR.

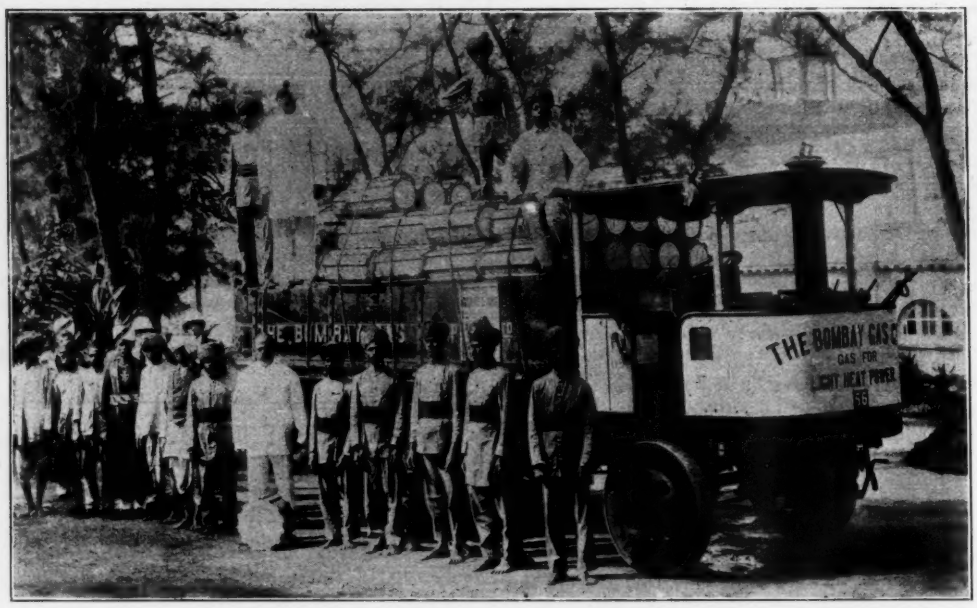


Photo by Bourne and Shepherd.

CHRISTMAS PUDDINGS FROM BOMBAY FOR THE TROOPS.

The photo appearing at the head of these notes to-day has been kindly forwarded by Mr. A. Dickson, Jun., the Secretary of the Bombay Gas Company, Limited. It shows one of the Company's steam motor-waggons being loaded-up at the Government House with Christmas puddings for shipment to the British Expeditionary Force at the front, and to the troops fighting in East Africa and Lower Mesopotamia. The waggons have also been used for transporting to the docks large quantities of gifts sent by the Bombay Red Cross Society to the European and Native troops at the front. We are gratified, and so will readers be, to note the following remarks by Mr. Dickson: "In the Far East, the gas industry is taking its share in providing for those who are fighting at the front. From a letter received this mail from our General Manager and Engineer, Mr. A. R. Burch, we learn that the members of the Bombay Gas Company's Social Club have been able to hand over the sum of Rs. 500, being the amount in hand after paying the expenses resulting from a dance given by the Club for the War Fund, under Lady Willingdon's patronage. In addition to the above sum, the Directors have already subscribed Rs. 1000 towards the Bombay War Fund, and the officers and staff in Bombay have subscribed among themselves another Rs. 1000."

It is stated in the report of the Directors that nearly 1700 employees of the Gaslight and Coke Company have responded to the nation's call, and are performing military duty in different parts of the country and abroad. This is indeed a good record.

The following announcement in the report of the South Metropolitan Gas Company for the past half year will be noted with a feeling of gratification: "The one bright spot in the half year just closed has been the alacrity with which a large proportion of the Company's employees have responded to the call of the country, and the willingness with which those left behind are performing the duties of the absent ones. Thirty-two per cent. of the staff and twenty-two per cent. of the workmen—a total of 1470 men—are serving in His Majesty's Forces."

The present critical condition of the coal market has led the Chairmen of the Gas Committees of the Manchester and Salford Corporations (Mr. William Kay and Alderman Phillips) to propose the holding of a conference; and they have sent the following letter on the subject to the Chairmen of other Corporation Gas Departments:

> In view of the great shortage of coal supplies, and the prospect of further reduction in such supplies, the position of the gas undertakings of the kingdom becomes one of considerable anxiety. The Gas Committees of Manchester and Salford are of opinion that, in the common interest, it is desirable that a conference on the situation should be held to decide upon the best measures to be taken to meet the difficulty. Their attention has been called to the Mines Regulation Act of 1910, which, by section 4, reserves means of suspending the limitation to eight hours' working; and they consider that strong combined representations should be made to His Majesty's Government to give effect to these powers for the period of the duration of the war. It is proposed to hold the conference at the Manchester Town Hall at 3 p.m. on Friday, the 5th of February; and we cordially invite you to take part therein, and to send representatives to attend.

Reference was made in last week's "War Notes" to a conference at Glasgow of the principal gas undertakings in Scotland, at which it was decided to approach the Government to ask for a suspension of the Eight-Hour Act for Miners, in order to relieve the present serious delays in the delivery of coal for gas-works. Reporting subsequently on the conference to the Dundee Gas Committee, Mr. Noble said it was agreed that Glasgow, Edinburgh, Dundee, and Aberdeen should form an Executive, and seek the co-operation of about twenty of the other gas undertakings in Scotland with the view of getting their support. It was also suggested that all the four cities should, if necessary, send deputations to London to support the memorial—not more than three from each city. He hoped that this would not be necessary, as the Glasgow Chamber of Commerce had passed a resolution in almost similar terms. He understood the Lanarkshire miners were only too anxious to get a longer working day. The matter was very important for Dundee. What they considered a safe stock was 9000 tons; but at present they had only 4000 tons. It was erroneous to say there was a sufficient supply of coal available. The Committee agreed to the sending of a deputation if necessary.

In connection with the scheme for the formation of a national dyeware undertaking, it was mentioned last week [*ante*, p. 184] that the Committee already appointed by the users of dyes would be enlarged, and would proceed to prepare a scheme on a modified financial scale. The members of the enlarged Committee are: Sir A. F. Firth, Sir Frank Hollins, Sir Mark Oldroyd, Mr. H. V. Christie, Mr. J. Clarkson, Mr. Charles Diamond, Mr. Kenneth Lee, Mr. G. Marchetti, and Mr. R. D. Pullar. The Committee met last Wednesday and Thursday at the offices of the Board and Trade, and eventually came to a unanimous decision in favour of the adoption of a modified scheme which, it is believed, will provide for rapid and effective action to meet the present emergency on lines acceptable to the various interests concerned, while being capable of future development into a more comprehensive scheme as and when opportunity permits. The approval of the Treasury for the revised financial arrangements has been obtained. Consultations have resulted in new proposals being put forward unanimously; and these were indicated at the end of last week by the Board of Trade, whose announcement will be found in the news columns of this issue.

The effect of the war on gas consumption in Germany has already been stated in the "JOURNAL" in so far as the month of August was concerned. In that month the gas consumed from 647 German gas-works showed a decrease of 4·4 per cent. as compared with August, 1913. Statistics for the months of September and October have now been published by the Central Gas Publicity Bureau. They show that the consumption from 604 works in September was 10·7 per cent. less than from the same works in September, 1913; and the consumption from 595 works in October was 11·1 per cent. less than from the same works in October, 1913. The number of consumers using both ordinary and prepayment meters continued, however, to increase. The increase in the number of ordinary meters, as compared with the corresponding months of 1913, was 4·9 per cent. in September and 4·2 per cent. in October; and the corresponding increases in prepayment meters were 18·2 and 14·7 per cent. respectively. Doubtless, a considerable proportion of the increase in the number of consumers is due to the efforts which have been made in Germany to induce all who have access to town gas supplies to

use gas in place of petroleum, in order that the small supplies of petroleum available may be at the disposal of rural households.

Following up the announcement of the Treasury [*ante*, p. 184] that, "until further notice, they feel it imperative, in the national interest, that fresh issues of capital shall be approved by the Treasury before they are made," the Chancellor of the Exchequer has appointed a Committee to consider and advise upon applications received by the Treasury for approval of fresh issues. This Committee held their first meeting last Wednesday; and, with the publication of the names of the members, it is safe to say that their deliberations will be regarded with a considerable amount of confidence by financial interests. The Chairman is Viscount St. Aldwyn; the other members being Lord Cunliffe (Governor of the Bank of England), Sir Frederick G. Banbury, Bart., M.P., the Right Hon. Sir Thomas P. Whittaker, M.P., and Mr. G. Stapylton Barnes, C.B. (of the Board of Trade). The Secretary is Mr. Basil P. Blackett, C.B. (of the Treasury).

A report of the General Purposes Committee of the Birmingham City Council has been issued, which deals with the allowances to certain officials and seasonal gas-works employees who are serving with the Colours. Having had referred to them any cases which appeared to require exceptional treatment, they report that they have had before them several instances of Corporation officials who, by reason of previous training, or the possession of special qualifications, had obtained Commissions. It was stated that officers had necessarily to incur certain expenses, which seriously reduced the amount left for the support of their wives and families. The Committee sought information on the subject from several Commanding Officers, who all agreed that this statement was correct; and the Committee came to the conclusion that, while these expenses varied according to circumstances over which the officer had no control, they might be safely averaged at £1 a week. They therefore passed the following resolution, which has been communicated to all the departments of the Corporation: "That, having regard to such expenses, the Government pay of officials accepting Commissions in H.M. Forces be reckoned, for the purpose of the Council resolution, as £52 per annum less than the actual pay, and that the amount to be paid to such officials be the difference between such reduced pay and the salary payable by the Corporation—this resolution to be retrospective."

The General Purposes Committee have also considered the case of those employees who are engaged by the Birmingham Gas Department and other Departments for a part of the year only, but who, being engaged year after year, may be said to be regularly employed; and they resolved that such men should be treated as ordinary workmen—this resolution also to be retrospective. They are of opinion that all men who enter the employment of the Corporation during the continuance of the war, to fill the places of those who have enlisted, should be told that they are engaged as temporary workmen only, and will not be entitled to any payment from the Corporation in the event of their enlisting; and they recommend that the Council should pass a resolution to this effect. They also recommend that, where any Corporation employees in the Forces die during the war, their dependants (if any) should receive the Corporation allowance for a period of six months after the death.

Sir Joseph Bellamy (the Chairman of the Plymouth and Stonehouse Gas Company), speaking at the annual meeting of the Port of Plymouth Chamber of Commerce last Thursday, referred to the efforts which the Chamber and certain employers of labour made in the early part of last year to increase the number of the Territorial Force. Many employers responded with generosity. One undertaking in the town had such a number joining the Colours that the additional payment they would need to make would cost them if the war lasted twelve months £1000. Sir Joseph's reference was no doubt to the Gas Company, who have over 60 men serving the country. As he rightly said, for a town of the size of Plymouth this is a very handsome reply, and shows that patriotism still counts for something with its people—those in the Gas Company's employ, at all events.

Mr. Norman Stewart Dougall, only son of Mr. J. Stewart Dougall, Engineer and Manager of the Boston (Lincs.) Gas Company, has been commissioned as Second-Lieutenant in the 7th Lincolnshire Regiment. Mr. Dougall is leaving Malvern College specially to take up his duties, and is to report himself at Oxford for instructions before proceeding to join his unit at Bovington Camp, near Wareham, Dorset.

At the meeting of the Stoke Newington Borough Council last week, Mr. Matthews drew attention to an account of £400 recommended for payment to the Gas Light and Coke Company, for supply to public lamps, &c. Not nearly so much gas, he said, was being used; and he wished to know whether any arrangement had been made with the Company for a reduction in the charges. Mr. Price (the Chairman of the Finance Committee) replying said that no arrangement had been made; but they were satisfied that the sum retained after paying the amount of £400 was as much as the Council could reasonably expect to be allowed. The Wandsworth Highways Committee have had under consideration the question of obtaining allowances from the gas companies in respect of the diminished lighting of the streets of the borough during the Christmas quarter. Allowances have been arranged with the Brentford Gas Company and the Gas Light and Coke Company; and the Committee are now in communication with the South Metropolitan Gas Company and the Wandsworth, Wimbledon, and Epsom Gas Company, with a view to obtaining allowances from them. The Committee estimate that the total allowance for the quarter will probably amount to £1300. The South Metropolitan Gas Company have agreed to a deduction of £520 off their account with the Southwark Borough Council for street lighting for the past quarter. Negotiations are in progress between the Council and the Gas Light and Coke Company for a similar rebate in respect of the lamps under that Company's control. The Borough Engineer of Woolwich has been in negotiation with the lighting authorities to obtain a rebate on the December quarter's accounts. From both the South Metropolitan Gas Company and the Gas Light and Coke Company he has obtained an allowance.

The recent airship raid on the East Coast has been followed by many further lighting restrictions in different parts of the country. In addition to notifications referred to last week, the street lighting of Grimsby and Hull has, it is reported, been discontinued. With regard to Leeds, the lighting of the main streets has, for the first time since the beginning of the war, been appreciably diminished. The restrictions were applicable chiefly to shops and to tramcars. Littlehampton is another place where the lights have been greatly reduced; and when the shops are closed, the place is in complete darkness. An order has been issued at Ipswich which, among other things, states that "the intensity of the inside lighting of shop-fronts shall be reduced from 6 p.m. so that no bright light is shed outside." A preliminary conference was held last week at the Manchester Town Hall, to discuss the precautions to be taken. An opinion was expressed in favour of the complete stoppage of the lighting of the huge illuminated signs over theatres, picture-houses, and newspaper offices, and also of some high advertising signs, as well as of buildings with glass roofs. The suggestion was made that all the street-lamps should have an opaque top covering, and that lights on tramcars should be treated in a similar fashion and be reduced in number. At the close of the meeting, it was stated that arrangements were being made for a conference on the subject at an early date between the municipal authorities in Lancashire and Cheshire and General Sir W. H. Mackinnon, the Military Officer at Chester in charge of the North-Western District. At Harrogate, on the other hand, Mr. J. S. Rowntree (the Chairman of the Wells and Baths Committee) has stated that, "at the present rate of insurance, and in view of the great odds in our favour, I would not agree to any restrictions in the lighting. It is far better for us to show a good front, instead of displaying nervousness about the risks." Again, Alderman Houfe (the Chairman of the Kursaal Committee) said: "From the point of view of getting visitors, I contend strongly that restrictions in lighting would jeopardize our prospects."

The Lighting, &c., Committee of Birmingham report that, in accordance with a Home Office Order under the Defence of the Realm Act, 1914, all public street-lamps have to be obscured so as to cut off direct light from the lamp in all directions above the horizontal. This is being done by painting the tops and by hanging tin plates inside the lamps. The work is being proceeded with as speedily as possible. As already recorded, a reduction of lighting is being made in the suburbs by discontinuing the use of every third lamp, excepting at street-corners and special places. This will obviate the obscuring of about 4000 lamps.

The Watch Committee of the West Bromwich Corporation, in a report issued on Saturday, state that they have had under consideration the question of the safety of the public against attacks by enemy airships or aëroplanes; and in order to mitigate any possible danger from aërial attacks at night, they recommend the Town Council to order that the public lighting of the main streets be reduced, and that tradesmen and shopkeepers be requested to reduce the lights in their windows. The Watch Committee of the Smethwick Corporation have instructed the police to request proprietors of picture houses, &c., to reduce their outside lighting until further notice, as a precaution against Zeppelin and other aircraft raids.

At a meeting of the Edmonton District Council last week, the Works Committee reported that a letter had been received from the Tottenham District Light, Heat, and Power Company stating that, after full consideration, the Directors did not see their way to make any reduction in the amount chargeable under their contract with the Council because of the reduced lighting. The Finance Committee, who met subsequently, however, announced that there had been an interview between the Engineers of the Company and the Council, and, as a result of a suggestion by the former, £105 had been deducted from the Company's account in respect of the period during which street lamps were not lighted.

At a meeting of the Balham and Tooting Traders' Association last Friday, the Chairman (Mr. Henry F. Cusden) reported the result of an interview a deputation from the Association had had that afternoon with Mr. Stokes, the Chief Inspector of the South Metropolitan Gas Company, with reference to the charges made by the Company for the rent and maintenance of outside high-

pressure lamps during the time that they could not be used owing to the restricted lighting order. Mr. Stokes had confirmed his previous decision that the Christmas accounts as presented should be settled, but that the Company would be prepared to receive half the previous charges made for the March quarter in connection with the high-pressure lamps, and, if possible, further concessions would be made so long as the Government order remained in force. Mr. Stokes added that 17 per cent. of the traders of South London had already paid their accounts without any comment. The Association had gone to a lot of trouble, and he (the Chairman) on behalf of the Committee felt that the results were satisfactory. Mr. W. Rabson opposed the acceptance of the concession, and proposed that a meeting of South London traders be called to consider the whole question. Mr. T. B. Ball said the Clapham Junction Association had taken legal opinion on the matter, and were advised that the charge was legitimate. Mr. Rabson maintained that the charges were illegal. Mr. E. Thomas proposed that the Association accept the proposals made by Mr. Stokes. Only four members voted in favour of Mr. Rabson's resolution, while five voted against it; the remaining members declining to vote. The Association decided to accept the terms offered by Mr. Stokes on behalf of the Company; leaving individual members free to take what course of action they chose.

British and German Refractory Materials.

In the course of an article on "Refractory Materials and the War," in the current number of the "Journal of the Royal Society of Arts," Dr. A. B. Searle says: "Retorts for the manufacture of coal gas cannot now be imported from Germany, so that gas engineers are compelled to use the home-made products. There is much divergence of opinion as to the relative values of British and German retorts; and it has not been unusual to find German engineers importing British retorts, while some British engineers have preferred to purchase German ones. Here again British manufacturers are trying to meet the demands as far as they are able to do so. The chief difference between British and German refractory materials may be traced to the difference in the ownership and management of the firms. In this country refractory materials are chiefly made by men who have worked themselves up from a small beginning, or the descendants of such men; their chief characteristic being that of a workman whose knowledge and experience have been gained almost entirely in the workshop, and whose theoretical knowledge—whether of chemistry, physics, or mechanics—is almost negligible. The German manufacturers of refractory materials, on the contrary, have almost invariably had a sound training in chemistry and engineering. They approach the manufacture from an entirely different point of view—viz., that of the user turned manufacturer. Consequently they are more impressed with the needs of the user, while the British manufacturer is chiefly impressed with the difficulties of manufacture and the limitations imposed by his material. If once this bias could be overcome—and the only remedy is the better education of the manufacturers—there is no question that better refractory goods can be made in Great Britain than can be obtained from the Continent for the same price."

Manchester and District Junior Gas Association.—The third of the series of lectures arranged to be held in the Manchester University Chemistry Theatre will be given by Mr. W. A. Tookey on Saturday next—subject: "Gas-Engines." The lecture will be followed by a discussion on "Naphthalene Stoppages."

London and Southern District Junior Association.—A visit will be paid by members next Saturday afternoon to the works at Waddon of the Croydon Gas Company. On the 19th inst. there will be a business meeting at the Westminster Technical Institute, when Mr. W. R. Twigg, of the Davis Gas-Stove Company, will read a paper dealing with the design and testing of gas-fires, and the question of heating by them.

Photometric Work at the Reichsanstalt.—The report recently issued of the Imperial Physical Technical Institute (Reichsanstalt) at Charlottenburg for the year 1913 records that 85 Hefner lamps were examined and certified there during the year, as well as a large number of electric photometric standard lamps. The research work carried out at the Institute included determinations of the specific heat at low temperatures of methane, acetylene, ethylene, ether, and argon, and of the specific heat of gases at high pressures. Investigations were continued and extended on the laws of radiation, and on Bauer and Kurlbaum's constants for Stephan's and Wien's law.

Reports of Gas Associations for 1914.—As announced in another part of the "JOURNAL," this work is now ready. The volume contains the collected reports, as given in our columns, of the proceedings at the meetings of the various District Gas Associations held in the past year. The technical matter occupies fewer pages than in the preceding volume (421 against 474), owing to the second half-yearly meetings of three of the Associations not being held on account of the European War. The papers are illustrated by 37 figures and a number of diagrams. Reference to any subject is facilitated by an index; and at the end of the book are given lists of the officers and members of the Associations. The volume, which is the thirty-second of the series, will form a useful companion to the "Transactions" of the Institution of Gas Engineers.

PERSONAL.

Mr. P. PARRISH has been appointed Manager of the South Metropolitan Gas Company's acid and ammonia works at East Greenwich.

Mr. T. N. RITSON, the Engineer and Manager of the Chichester Gas Company, was married last Wednesday to Miss Nancy Hammond, daughter of Mr. John Hammond, of Eastbourne.

The position of Deputy-Chairman of the Commercial Gas Company rendered vacant by the death of Mr. Walter Hunter has been filled by the appointment of Mr. H. E. JONES, M.Inst.C.E., who has had a lifelong association with the Company.

The Directors of the Cardiff Gaslight and Coke Company have elected Mr. CHARLES E. DOVEY, J.P., the Deputy-Chairman, as Chairman, in place of the late Colonel H. Oakden Fisher. Mr. W. MORGAN LEWIS has been made Deputy-Chairman.

Mr. HUBERT T. BAILEY, of the firm of Messrs. Stephenson Clarke and Co. (who is well known to many of our readers as a P.M. of the Evening Star Lodge, No. 1719), was last week elected a Director of the Great Eastern Railway Company in the place of the late Mr. J. F. S. Gooday.

Mr. C. F. KENT, who for thirteen years has held the position of Engineer and Manager of the Woburn Gas Company, has relinquished it to take an appointment at Outhwaite. During his connection with the Company the output of gas has more than doubled, and extensive improvements have been made in the works and plant. One of these is the provision of a new holder, of which Mr. Kent will just see the completion.

Mr. THOMAS F. CANNING, who has occupied the position of Assistant-Manager of the Ilford Gas Company for the past seven years, and is about to take up his duties as Engineer and Manager of the Weymouth Gas Company, was met last Friday evening by the Chairman of the Company, who, on behalf of the Directors, presented him with a silver tea-tray, suitably inscribed, and conveyed the thanks of the Board for his past services and their wishes for a successful future. On the same evening, Mr. Canning was the recipient of a gold watch-chain and seal from the Company's staff. The presentation was made by Mr. W. B. Farquhar, the Engineer and Manager, who referred in brief terms to the good fellowship which had existed between Mr. Canning and the staff. While regretting that they were losing him, they were very pleased to hear of his success, and wished him every prosperity and the best of health in his new home. They hoped he would be long spared to wear the token of regard which was being presented to him. Mr. Canning, in responding, said he was sorry to leave, and felt deeply indebted to the staff for the goodwill and kindness shown to him, not only on this occasion, but during the whole of the time he had been with the Company.

OBITUARY.

The death occurred on the 23rd ult., at the age of sixty-two, of Mr. CHARLES CRANFIELD, one of the Directors, and till lately Chairman, of the Witham Gas Company. Deceased was a member of the Urban Council for twenty years in succession, and retired last year after occupying the vice-chair for three years.

The death occurred last Thursday, at the age of eighty-five, of Alderman NATHANIEL BRADLEY. Deceased entered the Manchester City Council in 1894. Four years previously, however, he was appointed a Justice of the Peace, and, as a member of the Justices' Committee, he endeavoured to institute an efficient and uniform system of testing gas-meters.

The death, in action, at Lodz, on Nov. 24 last, is reported of Dr. HERMANN MANNES, of Weimar, near Hamburg. Deceased who had reached the age of 32, obtained his doctorate at Hanover for a thesis on the "Calculation of the Sizes of Distributing Mains." His professional work had been chiefly in connection with schemes of water supply and sewage disposal.

The proceedings at the meeting of the Stoke-upon-Trent Town Council last Thursday were interrupted by a tragic occurrence. Alderman FREDERICK GEEN, the ex-Mayor and Deputy-Mayor, was addressing the Council, when he was seized with illness, and was removed to an ante-room of the chamber, where he died a few moments later. Alderman Geen was first elected a member of the old Stoke Council in 1891, and was Chairman of the Gas and Finance Committees. He advocated the reconstruction of the gas-works, rather than the building of new ones; and his policy was carried out.

Under the heading "Chemical Industry" in the review of the past year contained in the Engineering Supplement to "The Times" last Friday, the following statement appeared: "There is a great scarcity, as is well known, of very many aniline colours, and of some colours in particular. For instance, as regards certain shades of alkali-resisting blues for printing inks, the immediate need is critical; and an immense amount of money is to be made by those who can produce them here quickly. A plant for the production of colouring matters of this kind has been erected by the Gas Light and Coke Company at their Beckton works, where also it is intended to undertake the manufacture of several of the intermediate products hitherto imported from Germany."

ABADY'S COMPILATION OF GAS, ELECTRICITY, AND WATER LEGISLATION.*

A book difficult to review is one which Mr. Jacques Abady has compiled and noted, and in which he has brought together and compared the provisions contained in the Model Bills, in Special and Municipal Acts, and in Provisional Orders, dealing with the three industries of gas, electricity, and water supply, during the past five sessions—that is to say, from 1910 to 1914. The difficulty lies in the fact that any substantial adverse criticism of the contents of the book would be directed to the Legislature's work, and not to that of the compiler; while the commendation would have to be shared between the Legislature and the compiler—the former for all that is excellent in the subject-matter, and the latter for the remarkable amount of industry, patience, and capacity that he has exercised in bringing together so much that is highly valuable within the covers of the book. Knowing something as to the many thousands of pages of printed matter that Mr. Abady must have waded through, the careful comparison work that has been entailed in a vast and yet minute exploration to discover variations of clauses from the models, and isolated special clauses, and the amount of note-taking that has been involved, the book tells the reviewer, as plainly as it can do without specific statement, that few people will envy Mr. Abady the conception and performance which give us a new book of reference and study in connection with the statutory control, privileges, and obligations associated with gas, electricity, and water supply. A book of this sort, to the best of our knowledge, has never been attempted before; and it may be taken for granted that all counsel, parliamentary agents, solicitors, companies, local authorities, consultants, and those who have any lot or part in the promotion of or opposition to Private Bills or Provisional Orders affecting the three industries will take prompt steps to have this book immediately at hand for consultation and inquiry. A book of the kind would often have saved the reviewer much time and labour in hunting up precedents; and it will be in this connection of immense use to promoters in deciding upon a scheme for any Bill which they may be contemplating, and in aiding them to supply any deficiencies that there may be in their existing statutory rights and authorization. The hope may be expressed, with the assurance that it will be endorsed, that Mr. Abady will find his book so largely acceptable, and thus have his industry rewarded by the knowledge that his labour has been of value, that from time to time he will issue a supplement to bring the usefulness of the volume up-to-date, and thus supply a continuous record from 1910.

To those engaged in the gas industry, and to those concerned with the legislation controlling its operations, the book will be particularly valuable. The five years from the parliamentary provisions of which the compilation has been made constitute a period of the weightiest importance to the future of the industry; and the legislation of that period, piecemeal though it be in its new aspects, portrays largely the beneficial change that has taken place in the industry, and has enlarged its horizon of service to the community and to its manufactures and trade. This is seen in the passing of the illuminating power standard and the establishing of the calorific power one; it is seen in the higher distribution pressures that are gradually being insisted upon; it is seen even in the jealousies of industries living upon the borders and utilizing the secondary products of the gas industry; it is seen in the changes in the control of the finances and general operations of gas undertakings; it is seen in the high-pressure meter clauses, in the withdrawal of the restrictions regarding sulphur compounds other than sulphuretted hydrogen, and even in the powers permitting wires and other equipment to be fixed to private premises, which tell of the central suspension of lamps for street lighting—it is all seen as the numerous clauses in the volume one after the other come under review. Several of them, as the pages of the book are turned, bring back to mind many a parliamentary tussle, and many a tense moment when waiting to see whether in a vital matter progress or obscurantism has carried conviction to a Committee; and yet all the live history associated with them are concentrated in comparatively few lines of printed matter. But the few lines constitute the law. Mr. Abady shows us here the exact position by massing together the clauses passed in Gas, Electricity, and Water Acts and Orders in the past quinquennium—the clauses as they appear in the Model Gas and Water Bills and Model Electricity Order and all textual variations of these clauses, together with a large miscellaneous collection of provisions which local, special, or changing circumstances have called for as a matter of necessity or propriety; and he quotes under each clause (when dealing with the special measures as passed) the Acts or Orders in which the clauses and their variants appear. By the aid of the copious index, one can lay hands immediately on the subjects required, the variations in particular powers, and the measures, with so to speak chapter and verse, in which one or the other is to be found. This is especially valuable, both on account of the suggestiveness and the ready availability of precedent; and in providing this Mr. Abady has done for all what each one concerned in these matters should (if he has not already done so) have systematically performed for himself.

In his "Introduction," the compiler states the scope of the book, as already indicated here; and he also sketches the plan he has followed in its preparation. In the first place, the "Model Bills and Clauses" for the years included in the survey have been examined, and the relevant clauses as amended in 1914 are printed in full. Then the clauses in Acts or Orders which vary from, or are not found in, the Model Bills are set out. Some difficulty has been experienced in drawing the line as to which clauses are standard, and which must still be regarded as special; but, according to the compiler's judgment, the latter are indicated by an asterisk. The special clauses are, he explains, those which have appeared in one or more Private Acts; but they must not be taken as having any established authority—their value depending largely on the manner of their origination. The standard and special clauses are arranged in the book in this wise: Electric Lighting Provisional Orders; Electricity (with Gas and Electricity) Acts; Gas Acts and Orders; Water Acts and Orders. Reverting to the references in the "Introduction" to the Model Bills and Clauses, the compiler says that these "include all the clauses as settled by the Lord Chairman's Counsel, which must be included in every Local and Personal Act dealing with the subject-matter, and many of these model clauses have been settled in order to carry out the decision of Joint Committees of the two Houses of Parliament appointed to deal with questions of special difficulty." What has happened in connection with the general gas powers clause and the residuals dealings authorization is an exception to the last statement; and as to the use of the term "must" in the preceding phrase, the variations from the models in different sessions, and as found in the book, suggest that a qualification might have been inserted.

The value of a work of this kind, comprising multitudinous subjects, is found in the completeness and comprehensiveness of its index. With a good index, the arrangement pursued by the compiler does not matter much. In the front of Mr. Abady's book, one gets a table of contents, which is sectionized, and under each section is the subject-matter with folio attached. Then we have, in alphabetical sequence, a list of the Acts and Orders examined, with page numbers of references. This list extends to nine pages. At the end of the book is the index, which, so far as it has been tested indiscriminately by the reviewer, has been found correct, and has enabled him to place hands on any clauses and textual variations which readily occurred to him for checking purposes. With the contents table and index, the book consists of some 392 pages. Though, however, a good index largely puts out of court any criticism on the subject of arrangement, there are a few minor criticisms that can be made in this regard. In the first place, Mr. Abady has chosen an alphabetical order for his title, putting electricity before gas, though the gas industry and gas legislation had a long start of the electrical industry, and therefore of its legislative authority—the legislation governing it, in fact, being based in no small degree on that passed for the gas industry. We come to the reprint of the Model Bills and Clauses as amended in the past session. The heading is "Model Bills—Electricity, Gas, and Water Clauses," &c. But the actual arrangement that follows is "Gas Bill," "Water Bill," and "Miscellaneous," the last of which embraces some electrical clauses. Then follow Electric Lighting Provisional Orders. The arrangement, we take it, is to give precedence to Bills over Orders; but it does not conform with what the title leads a reader to expect. The model form of Electric Lighting Provisional Order, and the clauses of Electricity Orders and Acts take us up to p. 140. Succeeding are clauses of Acts which deal with both gas and electricity, of which Acts there are now quite a number; and these are treated in the same systematic manner. Then follow the extensive sections dealing respectively with gas clauses and water clauses. It would have been better if, instead of massing the model clauses in front of the book, they had prefaced their own particular section, or, alternatively, if the model clause (where one exists) had preceded the group of variants in the later pages. As it is, when one comes to the variations in clauses (no matter where they happen to occur), one has to turn back to the very beginning of the volume to see the exact wording and form of the model. It would not do to take the "Model Clauses" in every respect without making thorough search into the point as to whether anything had happened affecting any particular clause which would be more useful than the standard form to promoters. There is an outstanding example in the general powers clause on p. 6. On p. 16, we have the new model clause referring to the maintenance of gas-works and the conversion of residual products, the adoption of which would impose the one-third restriction on residuals purchasing powers, and cause the renunciation of the principle of freedom in dealing in secondary products for which the gas industry has so strenuously fought—and won the fight, but the fruits of complete victory have not found their way into the Model Clauses. It is true the variations that have been made in the model provision affecting this matter are set forth at once by the compiler; but they are variations made not to carry out the report of the Joint Committee, but to meet the desires of the chemical manufacturers, who did not prove their case for restriction before the Joint Committee. But the investigator of this matter does not come across further reference to it until he arrives at p. 200; and then on p. 203 he finds set out the report and recommendations of the Joint Committee.

* "Clauses and Precedents in Electricity, Gas, and Water Legislation: Being a Comparison of the Provisions contained in the Model Bills, in Special and Municipal Acts, and in Provisional Orders, 1910 to 1914, relating to these Public Services." Compiled and noted by Jacques Abady, of the Middle Temple, Barrister-at-Law. London: Walter King. Price 15s. net.

We should have liked to see a closer association of the model clause and of the recommendations of the Joint Committee, so as to have brought into focus the exact position of the matter and the objections of the gas industry. It would have been preferable to have had it made a little more clear that the illuminating power clauses [quoted on pp. 22-23 from the 1913 model] are not necessary when calorific value clauses are inserted in Bills or Orders. The illuminating power provisions might, under the circumstance, have been given as a distinctive footnote. Then, in dealing with the clauses in Gas Acts and Orders, the history of what was done in this respect in the sessions of 1910-13 should have preceded, not succeeded, the full statement as to what happened in 1914—seeing that the latter hung upon the enactments in this regard of prior sessions.

But these are only criticisms bearing upon the form, and not in any way affecting the intrinsic value, of the book. There is one further point against which promoters should guard themselves. There are a number of clauses that have been put into Acts by agreement. They are quoted in the volume; but some of them are not provisions that gas undertakings should agree to, even to avoid parliamentary contest. The fact that they appear in certain Acts does not mean that they are compulsory on the demand of any authority, company, or person seeking protection. The pipe clauses, testing-places, pressures, and other matters might be quoted as examples. But those promoters who have the least doubt should not enter into any agreement whatever without consulting a firm of parliamentary agents fully *au courant* with these matters as affecting the industry. On the other hand, clauses are found in the book which have been little heard of, and have isolated embodiment in perhaps only one or two Acts, but would be valuable to many undertakings. To give an example. On pp. 238-239, there is found a clause (which appears in the Liverpool and Riddings Acts of last session) which indemnifies the Companies against injury arising from the neglect of road authorities to make good road surfaces. This bears upon the recent case in which the Commercial Gas Company were concerned, and which they unfortunately lost. It would perhaps, in connection with some of the clauses appearing in certain Acts, have been an advantage if the compiler had made a short statement as to the arguments *pro et con* (without committing himself by expressing any personal opinion on the merits of the arguments), as this might have saved from tripping up some of those who may be consulting the book. This, however, was evidently beyond the design of the work; and Mr. Abady did not desire to make the book a sort of "Michael and Will" in the matter of size.

Just by way of illustration of the method of treatment of clauses, quotation may be made of two sections from the close upon 1000 included in the book:

MINIMUM PRESSURE.

*450.—The following variations from the minimum pressure prescribed in the Model Gas Clause No. 27 (para. 48) are to be noted:—

(*a*) Six-tenths during day and eight-tenths during night.
Middlesbrough Act 1910, s. 8.
Margam Act 1911, s. 24.
Cudworth Order 1911, art. X.
Bala Order 1912, art. XI.
Harrington Order 1912, art. XI.
Biddulph Order 1913, art. XI.

(*b*) One inch.
York Act 1912, s. 48 subsec. 5.
Bournemouth Act 1913, s. 49.
Leighton Buzzard Act 1914, s. 27.

(*c*) Twelve-tenths.
Edenbridge Act 1914, s. 62.
Liverpool Act 1914, s. 37.

(*d*) Fifteen-tenths.
Skegness Act 1914, s. 65.

(*e*) Two inches.
Isle of Thanet Act 1914, s. 28.

POWER TO SUPPLY FITTINGS.—VARIATIONS OF MODEL CLAUSE.

*530.—A clause in the Model Bill para. 52 enables a gas company or local authority to provide gas-fittings. Sub-sections 2 and 4 of the Model Clause, q.v., regulate the proceedings of a local authority with reference to the sale or fitting of such fittings. The following local authorities have obtained power to supply fittings without the limitation contained in the aforesaid sub-sections.
Middlesbrough Corporation Act 1910, s. 5.
Middleton Corporation Act 1910, s. 35.

Here the gas section of the work has been mainly dealt with; but it may be said, without going into detail, that the other sections—electricity and water—are treated by the compiler with the same useful fullness.

The review may end up with a reiteration of the opinion that Mr. Abady has accomplished a valuable piece of work, the pages constituting which will be "well-thumbed" in many offices, as well as in the Parliamentary Committee rooms prior to and during immediate and many succeeding sessions.

Scottish Junior Gas Association (Eastern District).—The second quarterly meeting of the session will be held next Saturday at Dundee. Mr. Alexander Yuill has invited the members to inspect the new vertical retort installation at the gas-works; and as the time at disposal is limited, it has been decided to devote the afternoon to the inspection alone.

THE GAS LIGHT AND COKE COMPANY.

Half-Yearly Report.

THE following is the report of the Directors of the Gas Light and Coke Company for the half year ended the 31st of December, which, with the accounts (some particulars from which are given below), will be presented at the ordinary general meeting on Friday.

The accounts for the past half year show that, after providing for fixed charges and setting aside £10,000 towards the redemption fund, there remains a profit balance of £230,892 4s. 10d. The amount brought forward from the previous half year being £535,314 1s. 4d., there is a total available balance of £766,206 6s. 2d., out of which the Directors recommend the payment of a dividend on the ordinary stock at the rate of £4 13s. 4d. per cent. per annum, which will absorb £381,668 2s. 4d., and leave to be carried forward to the credit of the current half year £384,538 3s. 10d.

The sales of gas for the half year show a decrease of 4¾ per cent. on the quantity sold during the corresponding period of 1913. This result was brought about by the issue of police regulations for the earlier closing of licensed premises and the restriction of outdoor lighting under the Defence of the Realm Act.

In the early part of the past half year it became evident that the price of gas could not be maintained at 2s. 6d. per 1000 cubic feet; and the Directors therefore decided, with much regret, to increase the price to 2s. 8d. as from the date of recording the meter indices for the September quarter. This increase of price involves an automatic decrease of dividend to the lower rate now recommended.

There has been an increase during the past six months of 9533 in the number of consumers, and of 30,427 in the number of gas-stoves sold and let on hire.

The Bill promoted in the past session of Parliament dealing with the testing of the gas supplied by the Company received the Royal Assent on the 7th of August last.

The proprietors will no doubt be interested to learn that nearly 1700 employees have responded to the nation's call, and are performing military duty in different parts of the country and abroad.

The Court of Directors has been furnished by the several Engineers of the Manufacturing and Distributing Departments with certificates that all the Company's works and plant have been maintained in thorough efficiency.

CORBET WOODALL, Governor.

Horseferry Road, Westminster, S.W., Jan. 19, 1915.

The Accounts.

The accounts accompanying the report consist of the usual statements.

The statement of capital (stock) sets forth that the total paid-up is £10,413,480; added on conversion, £12,832,955—total amount authorized, £23,246,435. Deducting the amount redeemed, £226,995, the total amount of the Company's existing capital powers is £23,019,440. The statement of loan capital stands thus: Total paid up, £3,186,660; added on conversion, £1,618,190; unissued, £750,000—total amount authorized, £5,554,850.

The capital account shows receipts (with premiums, £1,688,957 14s. 8d.) to the amount of £29,513,247 14s. 8d. The expenditure is shown in the following items:—

Expenditure to June 30, 1914			£14,906,282 14 3
Expenditure during the half year to Dec. 31, 1914—viz.,			
Buildings and machinery in extension of works	£2,427 18 1		
New and additional mains and service-pipes	19,776 4 9		
Do. do. meters	18,848 11 0		
Do. do. stoves	41,240 4 8		
		82,292 18 6	
			£14,988,575 12 9
By sale of surplus land	£43,191 5 2		
„ depreciation of plant	3,305 1 2		
„ depreciation of meters and stoves	61,824 18 6		
		108,321 4 10	
Total expenditure			£14,880,254 7 11
Nominal amount added on conversion			14,451,145 0 0
			£29,331,399 7 11
Deduct amount of capital redeemed under Company's Act of 1903			226,995 0 0
			£29,104,404 7 11
Balance of capital account			408,843 6 9
			£29,513,247 14 8

The total of the net revenue account is £984,823 15s. 4d., compared with £1,233,262 on Dec. 31, 1913. The balance applicable to the redemption fund and to dividend on the ordinary stock is £776,206 6s. 2d.; and the following statement shows how it is proposed to appropriate it:—

Dec., 1913.			
£710,552	..	Net balance brought from last account	£535,314 1 4
317,243	..	Net revenue for the half year	240,892 4 10
£1,027,795			£776,206 6 2
15,000	..	Contribution to redemption fund	10,000 0 0
£1,012,795			£766,206 6 2
(£4 17s. 4d. p. ct.)		Dividend on the ordinary stock—	
£395,742	..	£4 13s. 4d. per cent. per annum on £16,357,205	381,668 2 4
£614,053	..	Balance carried to next account	£384,538 3 10

The three statements relating to the reserve, special purposes, and

depreciation funds stood as follows on Dec. 31: Reserve fund, £73,593; special purposes fund, £302,925; depreciation fund, £89,288.

The following is the revenue account:—

Expenditure.

December Half Year, 1913.		£ s. d.	£ s. d.
	Manufacture of gas—		
£782,607	Coal, including all expenses thereon	659,523 15 3	
46,376	Oil ,, less value of oil tar	100,847 5 3	
42,744	Coke and breeze used in the manufacture of carburetted water gas	44,845 4 4	
15,538	Salaries of Engineers and other officers at works	15,814 12 5	
102,810	Wages	91,280 9 5	
19,590	Purification	13,556 2 4	
259,882	Repair and maintenance of works and plant, materials and labour, less received for old materials, £5474 13s. 11d.	210,934 10 1	
			1,136,801 19 1
	Distribution of gas—		
60,666	Salaries and wages of officers (including rental clerks)	59,524 1 8	
100,295	Repair and maintenance of mains and service-pipes, &c.	93,328 9 2	
80,454	Repair and renewal of meters	88,904 2 8	
105,959	,, ,, stoves	104,499 4 7	
21,548	Gas-fittings, including labour (automatic meter supplies)	16,231 9 3	
			362,487 7 4
27,680	Public lamps—lighting and repairing	..	28,446 4 6
	Rents, rates, and taxes—		
7,153	Rents payable	7,110 1 3	
153,953	Rates and taxes	162,418 6 4	
			169,528 7 7
	Management—		
3,750	Directors' allowance	3,750 0 0	
300	Company's Auditors and Assistant	300 0 0	
9 276	Salaries of General Manager, Secretary, Accountant, and clerks	9,727 4 3	
26,876	Collectors and cashiers	27,101 0 7	
5,177	Stationery and printing	5,518 2 8	
7,571	General charges	8,103 3 7	
			51,499 11 1
23,000	Co-partnership, for the half year	..	17,000 0 0
1,160	Parliamentary charges	..	67 2 0
1,358	Law charges	..	1,019 12 3
6,151	Bad debts	..	6,076 0 3
500	Depreciation fund for works on leasehold lands	..	500 0 0
28,295	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	27,859 2 11
..	Allowances to employees on Active Service	..	7,124 3 9
2,785	Workmen's compensation account	..	2,010 18 2
4,522	Company's Contribution under National Insurance Act, 1911	..	4,317 2 2
	Public officers—		
751	Gas Referees and Official Auditor	859 17 7	
613	Public testing-stations	566 8 8	
			1,425 6 3
£1,949,310			1,819,163 17 4
522,710	Balance carried to net revenue account		449,509 14 0
£2,472,020			2,268,673 11 4

Revenue.

December Half Year, 1913.		£ s. d.	£ s. d.
	Sale of gas—		
	Per meter at 2s. 6d., 2s. 8d., 2s. 10d.,		
£1,573,160	2s. 2d. and 2s. 4d. per 1000 cubic feet.	1,569,790 19 11	
63,210	Public lighting and under contracts	50,484 5 8	
			1,620,275 5 7
£1,636,370			
73,225	Rental of meters	..	75,357 12 10
70,039	Rental of stoves	..	75,508 10 5
95,081	Rental of fittings	..	93,388 3 9
	Residual products—		
£362,309	Coke, less for labour, &c.	241,492 9 0	
26,501	Breeze, less ,,	11,022 14 4	
89,770	Tar and tar products	68,437 3 0	
112,910	Ammoniacal liquor and sulphate of ammonia	75,072 17 8	
			398,045 4 0
£591,490			
£5,512	Rents receivable		5,925 9 9
303	Transfer fees		173 5 0
£2,472,020			2,268,673 11 4

The following statements relate to the working:—

Statement of Coal, &c., Used.

Description of Coal.	In Store June 30, 1914.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1914.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	224,177	724,392	816,481	1665	130,423
Cannel	8,587	..	171	..	8,416
Total	232,764	724,392	816,652*	1665	138,839

* In addition to this quantity of coal, 8,304,525 gallons of oil were used during the half year.

Statement of Residual Products.

Description.	In Store June 30, 1914.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store, Dec. 31, 1914.
Coke—tons	114,705	503,992	102,584	454,419	61,694
Breeze—tons	6,750	102,387	13,718	78,255	17,164
Tar, from coal only—galls.	1,049,092	8,576,786	7,286,523	381,601	1,957,754
Ammoniacal liquor—butts	23,670	242,639	243,633	..	22,676

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
*13,813,324	378,985	12,348,056	12,895,929	44,768
†14,525,698	470,353	12,887,400	13,532,525	45,645

* Including 3,670,865,000 cubic feet of carburetted water gas. † Dec. half year, 1913.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the half year as follows: Coal, £112,762; gas oil, £27,114; coke, £32,389; tar and ammoniacal liquor and products, £136,056; and sundries, £357,008. The figures this time last year were: Coal, £223,956; gas oil, £32,935; coke, £55,293; tar, ammoniacal liquor, and products, £137,728; sundries, £294,919.

SOUTH METROPOLITAN GAS COMPANY.

The Directors' Report and the Accounts.

THE following is the report of the Directors of the South Metropolitan Gas Company for the six months ended the 31st of December, which, with the accounts (an abstract of which appears below), will be presented to the proprietors at the half-yearly meeting to-morrow week.

The result of the half-year's working, after providing for payment of the statutory dividend at the reduced rate of £5 4s. per cent. per annum, shows a deficiency of £25,546, to meet which the sum of £26,748 brought from the last account is available; leaving £1202 to be carried forward. The loss is not surprising when the diminution of the hours of lighting and the reduction of the amount of light permitted are considered. Climatic conditions, too, have been unfavourable to the extended use of gas for heating, though the large number of stoves fixed gave promise of a considerable increase of income from this source. Under these circumstances, the falling-off in gas sales of 4·29 per cent. compared with the corresponding half year cannot be considered disappointing.

The price of residuals during the half year has been unsatisfactory. The markets for coke and ammonia, however, show some signs of recovery; but tar has been affected owing to the disturbance by the war of the shipment of pitch for briquette making.

The heat process for the removal of the bisulphide impurity has been extended, and continues to give satisfaction.

Two Bills are being promoted in the coming parliamentary session in which proposals are being made to place upon the ratepayers of London the burden of providing for deficiencies arising out of the non-remunerative sale of electricity. London's gas supply has attained its present efficiency without aid from the rates, and the various electrical undertakings have been sufficiently long established to be run on their merits without being subsidized to meet competition.

By far the greatest anxiety of those responsible for the provision of the gas required by the Metropolis arises from the attitude of the Government in regard to the freighting of coal from the North to the Thames. Current contracts which were originally made at 3s. per ton have been mutually increased to 5s., to cover the reduced earning capacity of the steamers, higher wages, and insurance for war risk. This figure leaves a handsome profit to the shipowner; but the Government has acquiesced in no less than 13s. 6d. per ton being paid for the use of interned steamers chartered through their agents in lieu of those commandeered for Navy purposes. To place such a burden, amounting to about 9d. per 1000 cubic feet of gas, upon the people of London, most of whom belong to the poorer classes, is unfair in the extreme.

The one bright spot in the half year just closed has been the alacrity with which a large proportion of the Company's employees have responded to the call of the country, and the willingness with which those left behind are performing the duties of the absent ones. Thirty-two per cent. of the staff and 22 per cent. of the workmen—a total of 1470 men—are serving in His Majesty's Forces.

Two Directors (Mr. John Ewart and Mr. John Mews) and one Auditor (Mr. Chas. Mortimer) retire by rotation. They are eligible, and offer themselves for re-election.

CHARLES CARPENTER, Chairman.

709, *Old Kent Road, S.E., Jan.* 27, 1915.

The Accounts.

The following are the principal portions of the accounts accompanying the preceding report.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third

statement is the capital account. It stands as follows: Amount received, £5,328,820; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows:—

Capital account to June 30, 1914		£5,100,142 13 10
Expenditure during half year to Dec. 31, 1914—viz.:		
New buildings and machinery	£6,491 0 0	
New and additional mains and services	2,639 16 2	
New and additional meters	4,060 1 4	
New and additional stoves	7,107 14 7	
	20,298 12 1	
Total expenditure		£5,120,441 5 11
Balance		208,378 14 1
		£5,328,820 0 0
Nominal amount added by conversion, less premium		2,996,520 0 0
Total		£8,325,340 0 0

The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal into store, including £3346 2s. 3d. for London Port and tonnage dues	£403,573 3 4	
Purification	17,837 13 10	
Salaries of Engineer and Officers at works	18,688 16 6	
Wages (carbonizing)	49,367 5 5	
Repairs and maintenance of works and plant, less £5889 12s. 6d. received for old materials	107,307 16 4	
	£596,774 15 5	
Co-partnership	20,000 0 0	
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes	£37,613 19 1	
Salaries and wages of officers, including rental clerks	21,441 2 2	
Repair and renewal of meters	31,108 5 10	
Repair and renewal of stoves	35,432 19 3	
Repair and renewal of gas-fittings	28,444 11 10	
	154,040 18 2	
Public lamps, labour and materials £15,306 7s. 9d., less £14,206 16s. 6d. received for the same	1,099 11 3	
Rents, rates, and taxes—		
Rents payable	£1,463 14 1	
Rates and taxes	57,797 8 8	
	59,261 2 9	
Management—		
Directors' allowance	£2,856 6 3	
Salaries of Secretary, Accountant, and clerks	3,800 3 2	
Collectors { Ordinary	5,381 12 0	
Collectors { Slot meter	11,702 16 8	
Stationery and printing	4,351 2 0	
General charges	11,579 15 2	
Company's Auditors	112 10 0	
	39,784 5 3	
Miscellaneous—		
Law charges	577 0 2	
Parliamentary charges	200 0 0	
Bad debts	1,539 7 11	
Stolen from 1084 slot meters broken open	273 1 11	
Superannuation, sick, and accident funds	6,356 15 11	
National Insurance Act charges	1,667 15 5	
Gas Referees and Official Auditor	351 13 3	
Leasehold renewal fund	500 0 0	
Employees' Reservists fund	3,207 18 3	
Total expenditure	£885,634 5 8	
Balance carried to net revenue account	179,985 10 11	
	£1,065,619 16 7	

Receipts.

Sale of gas—		
Michaelmas, at 2s. 2d. per 1000 feet	£276,647 12 4	
Christmas, at 2s. 4d. per 1000 feet	408,304 8 10	
	£684,952 1 2	
Public lighting	14,517 8 6	
	£699,469 9 8	
Company's meters at rent: Ordinary, 95,435; slot, 275,111	£42,524 15 0	
Company's stoves at rent: Ordinary, 83,927; slot, 228,902; fires, 50,010	38,648 1 6	
Gas-fittings	46,077 11 6	
	127,250 8 0	
Residual products—		
Coke, less labour and cartage	£151,089 5 2	
Breeze, " "	280 6 8	
Tar and tar products, less labour	29,690 8 11	
Sulphate of ammonia " "	56,258 9 2	
	237,318 9 11	
Rents receivable	1,524 19 0	
Transfer fees	56 10 0	
Total receipts	£1,065,619 16 7	

Total amount paid in salaries for half year, £45,598 17s. 4d.
" " " wages " £298,752 18s. 1d.

The net revenue account shows a sum of £168,379 applicable to dividend on the ordinary stock.

The balances of the reserve, renewal, and insurance funds stood as follows on Dec. 31 last: Reserve fund, £199,901; renewal fund, £25,546; insurance fund, £21,075.

The following tables relate to working:—

Statement of Coal.

In Store June 30, 1914.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1914.
Tons. 181,056	Tons. 555,218	Tons. 545,476	Tons. 961	Tons. 189,837

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands. 6,880,774	Thousands. 156,202	Thousands. 6,191,406	Thousands. 6,427,651	24,822

Statement of Residual Products.

Description.	In Store June 30, 1914.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1914.
Coke—tons	105,746	336,354	92,076	297,819	52,205
Breeze—tons	36,718	53,506	31,061	24,797	34,366
Tar—gallons	422,719	5,190,065	5,160,273	13,451	439,060
Ammoniacal liquor—butts	8,112	209,138	205,140	..	12,110

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £140,204; coke and breeze, £41,700; tar, ammonia, and products, £82,231; and sundry plant and stores, £345,831. The figures this time last year were: Coal, £135,691; coke and breeze, £46,824; tar, ammonia, and products, £93,658; and sundry plant and stores, £339,598.

A sum of £75,220, co-partnership bonuses and savings, has been deposited with the Company; and the total of the superannuation and guarantee funds is £72,760. The figures last year were £40,477 and £68,771.

COMMERCIAL GAS COMPANY.

Half-Yearly Report.

THE following is the report for the six months ended the 31st of December, which the Directors of the Commercial Gas Company will present at the half-yearly meeting on Thursday.

The Directors submit the accounts for the half year ended Dec. 31, 1914. The revenue account shows a net profit for the half year of £46,208 2s. 7d., which, added to the balance of £79,569 9s. 4d. brought forward from the previous half year, produces a net revenue balance of £125,777 11s. 11d. Deducting therefrom £8206 3s. 7d. for interest, there remains standing to the credit of the net revenue account a balance of £117,571 8s. 4d. available for dividend. The Directors recommend the payment of dividends thereout at the rates of £5 9s. 4d. per cent. per annum upon the 4 per cent. stock of the Company, and of £5 6s. 8d. per cent. per annum upon the 3½ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

The Directors announce, with much regret, the death of their esteemed colleague, Mr. Walter Hunter, who was for twenty years a Director of the Company, and fourteen years Deputy-Chairman of the Board. In conformity with the Acts of Parliament regulating the Company, they have elected Mr. Thomas Fowell Victor Buxton to the seat on the Board thus vacated.

Sir Frederick Green and Mr. H. E. Jones, two of the Directors, retire by rotation, and, being eligible, offer themselves for re-election. Mr. B. W. Ellis, one of the Auditors, will go out of office by rotation, and, being eligible, offers himself for re-election.

WILLIAM GRAHAM BRADSHAW, Chairman.

Gas-Works, Stepney, Jan. 27, 1915.

The Accounts.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 31st of December amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added by conversion; making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. Capital account receipts amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,447,844 12s. 6d., with a nominal amount of £1,212,812 10s. added by conversion—together, £2,660,657 2s. 6d. There is thus a balance of £54,591 18s. 1d. carried to the balance-sheet. A sum of £1624 was expended during the half year on new and additional mains, services, stoves, &c. The reserve fund amounted at the close of the half year to £40,500, and the insurance fund to £34,324.

The following is the revenue account:—

Receipts.

Sale of gas—			
Per meter (number in use, 113,894) at 2s. 4d. per 1000 cubic feet	£189,243 3 5		
Public lighting and under contracts	5,272 11 11		
	£194,515 15 4		
Less discounts and allowances	5,148 17 10		
		£189,366 17 6	
Rental—			
Meters (24,188)	£2,887 2 11		
Stoves (77,373)	12,400 11 3		
Prepayment meters and fittings (89,021)	18,379 2 2		
Maintenance of mantles and fittings	822 16 5		
		34,489 12 9	
Residual products—			
Coke, less £3750 12s. 1d. for labour	£31,045 7 6		
Breeze, less £835 3s. 10d. for labour	1,317 12 10		
Tar	9,350 14 1		
Ammoniacal liquor and sulphate of ammonia	10,086 1 5		
		51,799 15 10	
Miscellaneous receipts—			
Rent receivable	£0 10 0		
Transfer fees	21 15 0		
		22 5 0	
Total receipts		£275,678 11 1	

Expenditure.			
Manufacture of gas—			
Coal and oil, including dues, carriage, unloading, and trimming	£106,670 2 9		
Salaries of Engineer and officers at works	2,901 9 9		
Wages (carbonizing)	10,670 4 5		
Purification, including labour	1,149 10 8		
Repair and maintenance of works and plant, materials and labour (less £263 19s. 7d. received for old materials)	30,769 7 6		
		£152,160 15 1	
Profit sharing		3,715 19 11	
Distribution of gas—			
Salaries and wages of officers (including rental clerks)	£5,323 17 11		
Repair, maintenance, and renewal of mains and services, material and labour	8,564 1 1		
Repair and renewal of meters	3,172 7 10		
" " " " stoves	10,872 16 4		
" " " " prepayment meters and fittings	11,299 17 4		
Maintenance of mantles and fittings	1,083 5 8		
		40,316 6 2	
Public lamps—lighting and repairing		2,763 5 2	
Rent, rates, and taxes		15,741 1 10	
Management—			
Directors' allowance	£1,250 0 0		
Company's Auditors	75 0 0		
Salaries of Secretary, Accountant, and clerks	923 6 5		
Collectors' salaries and commission	1,573 3 5		
Prepayment meter collection	3,609 13 7		
Stationery and printing	1,151 19 4		
General charges	2,302 17 0		
		10,885 19 9	
Bad debts		419 18 1	
Law and parliamentary charges		308 1 6	
Superannuations and allowances and Workmen's Benefit Society, &c.		2,530 0 1	
Official officers, &c.		118 17 11	
National Health and Unemployment Insurance		510 3 0	
Total expenditure		£229,470 8 6	
Balance carried to net revenue account		46,208 2 7	
		£275,678 11 1	

The following statements relate to the working :—

Statement of Coal and Oil.

—	In Store June 30, 1914.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store Dec. 31, 1914.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	25,076	87,375	90,417	522	21,512
Oil—gallons	489,401	1,130,805	1,266,328	..	353,878

Statement of Residual Products.

Description.	In Store June 30, 1914.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1914.
Coke—tons	16,611	56,511	6,359	62,431	4,331
Breeze—tons	4,798	7,734	..	7,266	5,266
Tar—gallons	272,287	1,146,809	..	984,486	434,610
Ammoniacal liquor—butts of 108 gallons	12,934	33,172	34,919	..	11,187
Sulphate of ammonia—tons	80	1,142	..	1,062	160

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,832,248	29,229	1,623,640	1,680,352	3,818

The last statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows : Coal, oil, &c., £23,403 ; coke and breeze, £3128 ; tar, ammoniacal liquor, sulphate of ammonia, &c., £10,725 ; sundry stores, £36,606—total, £73,862. The figures this time last year were : Coal, oil, &c., £26,665 ; coke and breeze, £10,344 ; tar, ammoniacal liquor, sulphate of ammonia, &c., £9277 ; sundry stores, £34,976—total, £81,262.

The Calorific Standard for Canada.—It was mentioned in the "JOURNAL" for Dec. 1 (p. 481) that the Canadian Inland Revenue Department had recently had under consideration the question of determining the calorific standard for manufactured gas throughout the Dominion, which will come into force on the 1st of April next. It was suggested that 550 B.Th.U., with a permissible variation of 5 per cent. before a penalty is incurred, should be fixed; but the views of parties interested were to be invited. Accordingly a Special Committee of the Canadian Gas Association had an interview with the authorities of the Inland Revenue Department; and Mr. Arthur Hewitt, of Toronto, speaking on behalf of the gas companies, made a strong plea for 540 B.Th.U., with a variation of 7½ per cent., as fixed for the Gas Light and Coke Company. We learn from the "Intercolonal Gas Journal of Canada" that the Government representatives were very much impressed with the arguments adduced; and that early in the present year a decision will be given which, it is believed, will be satisfactory to all parties.

ELECTRICITY SUPPLY MEMORANDA.

War and Fuel for Central Stations.

In their affliction in respect of coal supplies, owing to heavy freightage and shortened transport facilities, gas undertakings in and about London and southwards have as fellow-sufferers electricity stations. Like those of gas concerns, their coal reserves are (through the impossibility of any deliveries coming through according to schedule) being eaten into at a disconcerting rate. But not all electricity concerns are particular about large coal reserves; consequently the present trouble has caught a number situated at a distance from the coal-fields hardly pressed for sufficient supply. The "Electrician" says that "*many* electric-supply undertakings, especially those in the South of England, are experiencing considerable difficulty in maintaining their supplies of coal." Instance is made of Redhill and Portsmouth. At the former place, the contractors cannot guarantee regular supplies. Portsmouth obtains its coal for the electricity station by water; but the supply is restricted, and the fear exists that it will be impossible to maintain it. The Committee have therefore an eye on railborne coal; but they are only going to have recourse to this as a last resort. We are afraid that Portsmouth will find supplies by rail merely coming through in driblets, and not with the regularity that users would prefer. Of course, the use of a few German ships under detention will not relieve the situation largely for London and the neighbourhood; and, as the rate of freights for these ships is to be the inflated market one, the price of coal carried by them will be at least 10s. higher than the contract rates delivered preceding the war. While electricity concerns are paying heavily for coal, and suffering torments over the future (the position is a really grave one for all large coal users), they should not neglect consideration of coke for steam-raising, especially those stations with forced draught attachments to their boilers. It is true there is now a run on coke; and an exceptionally large quantity is being used by gas undertakings for the production of carburetted water gas, so as to spread their coal stocks over as long a period as possible. Nevertheless, gas undertakings have no objection to cultivating the central station as an outlet for coke; and a trial in the hours of their greatest coal need would, we are certain, assure its continued use when normal times return.

Oven-Heat Control.

It is interesting to find that Mr. Arthur F. Berry, the inventor of the "Tricity" cooker, harbours no anticipation that the cookers of the electrical tribe are going to entirely sweep gas-cookers into oblivion. The view that they are destined so to do we know is held by a few persons who try to make life cheerful by a display of nonsense on the electric-cooker stage—nonsense more particularly directed to the gas-cooker and to demonstration work befitting a nursery with the domestic electric-cooker. Not long ago some tests were published which showed that electric ovens of the biscuit-tin type take longer to heat up to a given temperature (with equal loading) than the ovens of the battleship type, with heavy double casings and thick lagging between; and that the former also part with their heat quicker than the latter. This was an uncomfortable revelation for the firm who have sent their missionaries here, there, and everywhere in the country to preach the gospel of slow low-temperature cooking by electrical means, and to speak all manner of evil against the gas-cooker for the sake of the electric-cooker, until, among a certain section of electrical opinion, falsity of the kind has become part of its accepted dogma. Now Mr. Berry, we see from a patent specification, has been looking into the question of how he can improve the temperature efficiency of not only electric-cookers but of gas-cookers. Much heat and much time, he says, have hitherto been spent in heating-up oven walls and fittings prior to cooking. Including this preliminary heating, the efficiency of the present methods is necessarily very low—an efficiency of 20 per cent. of the heat energy expended being usually considered very good for cooking ovens as at present constructed. We are indebted to the inventor for the use of the word "usually" as it clearly denotes exceptions.

How It is Done.

The invention which Mr. Berry has added to a long list of predecessors has for its object the avoidance of the need for the preliminary heating of the oven in cases "where the heating agent—such, for example, as electricity or gas—is capable of being controlled." One of the "eccenTricity" lecturers, who professes to a little unscientific knowledge on the subject of the relation of flame temperatures to gas compositions, pressures, and so forth, has before now maintained that gas is not capable of being controlled. Sir William Ramsay, on the other hand, says it is. Mr. Berry now also acknowledges the same thing; so the "Tricity" lecturer is in this matter, as he has often been in others when attacking gas, very much at sea. But that in passing. A further intention of the invention is to enable air to be heated and utilized for cooking in a better manner than heretofore, so as to raise the efficiency and duty of the heat produced, and thereby reduce the cost of running electric and gas heated ovens. This object is attained by localizing the heating of the air, so that it can be rapidly raised to the required high temperature, and be

directed on to the article to be cooked—afterwards permitting the heating effect to be reduced to meet the requirements for slower cooking. This is done by providing with the heaters or burners, guide-plates or baffles arranged in such manner that the air-heating zone is comparatively small, so that the air flowing therethrough comes into close contact with the heating surface or surfaces or gas-jets, and then be at once guided away to the cooking region. The invention allows several forms of construction to attain the end in view. The first claim crystallizes the matter: "A cooking-oven provided with a plurality of heaters and pivoted air-guiding devices, having inner upwardly and inwardly inclined surfaces, and outer upwardly extending surfaces, and the lower edges whereof can be moved to one side or the other of the said heaters, so that the currents of heated air arising therefrom can be directed inwardly, to flow centrally up past the inner inclined surfaces, and descend at the sides of the oven, and at another time be diverted so as to rise at the sides of the oven and descend centrally."

The Higher Efficiency Movement.

Ignoring for the moment the eye-impairing demerit of electric lamps—lamps of high intrinsic brilliancy, and luxuriant in the rays that are of no good to the optical equipment of the human being—an interesting question is raised as to the proper policy to pursue by electricity concerns in view of the fact that there are domestic electric-lamps on the market that do not enhance the reputation of the electricity industry. The gas industry can condole with its trading rival from years of experience. Mr. John W. Lieb, of the New York Edison Company, has been considering in a paper how best to meet this condition of things—a condition neutralizing the best efforts of the electricity supply undertakings. He holds that the including of lamp renewals in the rates of lighting service gives the best control on the part of electricity suppliers. The second best practice is the sale of lamps by central stations at figures materially below the list prices. Then the retail lamp dealers have an opportunity of also organizing a profitable lamp business, and usually succeed in supplying a substantial proportion of lamps to consumers. But this policy stimulates inducement on the part of dealers to meet the relatively low prices of the central station by purveying low-grade cheap lamps, in which event this second method of control from the central station of the lamp supply tends to defeat its own end. The sale by the central station of lamps at list price does not help matters much, as the larger proportion of the custom is then obtained by the retail lamp dealers. In furnishing good lamps under the renewal system, at prices included in the electricity rates, the undertaking is looking to the commercial success of the electricity supply business; and the lamp is a factor of the first importance. The retail lamp dealer has only the one aim—to make a profit out of the sale of the lamps. He has little concern with the question of unsatisfactory lighting service, unless it is of such a nature as to jeopardize future sales of lamps. On the whole, the free lamp renewal system gives the best control, although it makes the electricity account look larger. In America central stations have found that co-operation with the lamp dealers has also beneficial results. Buying lamps on systematic efficiency tests carried out by the central stations has likewise excellent effect in keeping makers up to the mark. Electricity users are not in the position, and lamp dealers are not in the habit, of carrying out efficiency tests; and the dissemination of information among them as to good class goods is another way of helping forward the higher efficiency movement—in gas as well as in electric lighting.

Inconclusive Electrical Comparisons.

Electricians we were always taught to believe were trained to do things with mathematical accuracy. But experience shows that training theory is not carried into daily practice. An example is found in the foolish comparisons of costs that are published to evidence the remarkable economy of electric cooking. The "Electrical Times" is fond of this sort of display. It has published further figures; but not a word accompanies them as to the quantity of work and value represented by the expenditure. In this fresh instance, a small householder—he must be a very small one—is concerned in the comparative costs, which are as follows:

Electricity and Gas. Quarter ended Dec. 25, 1914.	£ s. d.	Gas. Quarter ended Dec. 25, 1913.	
Lighting: 66 kelvins at 5½d. =	1 10 3	Lighting and Cooking	36,300 cubic feet at 2s. 4d. =
Cooking: 300 kelvins at 1d. =	1 5 0		
Gas: 12,000 c. ft. at 2s. 4d. =	1 8 0		
	£4 3 3		£4 4 8

It will be observed that under electrical operation gas is also used; this being for a gas-ring for water boiling, and, we have no doubt, for other operations in connection with the preparation of meals. It will also be remarked that, while the householder paid £1 10s. 3d. for 66 units of electricity for lighting, a considerate electricity supply undertaking allowed him to have for intermittent cooking 300 units (or four-and-a-half times as much) for 5s. 3d. less; whereas in the corresponding quarter of the preceding year, the total gas account only came to 1s. 5d. more, charging out all the gas for lighting, cooking, and water heating on the flat lighting rate of 2s. 4d. per 1000 cubic feet. No particulars are given as to the relative lighting power derived, nor as to the quantity of cooking and other kitchen work represented by the respective accounts. In the house occupied by the present writer, where lighting, cooking, and part of the heating is done by gas, and with only a small family, the consumption varies by 3000 and 4000 cubic feet between corresponding quarters with the equipment the same, which demonstrates that the quantity of work done is not uniform in corresponding quarters. It cannot possibly be. Atmospherical, domestic, social, health, and all sorts of variable conditions come in to interfere with even approximately correct comparisons. This we would guarantee, that with £2 15s. 3d. worth of gas at 2s. 4d. we would do more work in any one line than with the £2 15s. 3d. worth of electricity mentioned in the above accounts. The utmost thermal value realizable from the 366 units is 1,251,720 B.Th.U.; while £2 15s. 3d. worth of gas at 2s. 4d. would supply 10,276,500 B.Th.U. at only 500 B.Th.U. per cubic foot, instead of the statutory standard of 540 B.Th.U. The average price received by the electricity suppliers for the 366 units is only 1·8d. per unit, while the average price received by the gas company is 2s. 4d. per 1000 cubic feet. For the 1·8d. the electricity undertaking only supplied 3420 B.Th.U., while the gas suppliers gave 27,900 B.Th.U.; or, if we only take the cooking units at 1d., the corresponding figures are 3420 B.Th.U. for electricity and (at 500 B.Th.U. per cubic foot) 15,500 B.Th.U. for gas. These quarterly figures, *minus* all the factors proving comparability, are absolutely worthless. We should like to see the "Electrical Times" trying to prove that with 1,251,720 B.Th.U., it could do as much work as with 10,276,500. B.Th.U. supplied by another form of controllable heat energy. We are not dealing with the open fireplace, which dissipates a large percentage of the heat units of the coal in disposing of its volatile constituents and in raising the black mass to incandescence, delivering at the same time an enormous percentage of the heat units to the open chimney, but with a fuel utilized in apparatus which is not of the crude order of the precursors of the present-day types. The figures given by our contemporary do not include meter-rent, nor any other costs. It is obvious that the consumer under the electric-gas *régime* must have three meters for which to pay rent—one for electric lighting, one for electric cooking, and one for gas—as also special wiring for the cooker. With gas, one meter, one set of fittings, and one account are considerations, as well as the wider range of application, and the initial cheapness of the apparatus and low cost of upkeep.

Municipal Competitive Trading.

"Electrical Industries" draws attention to the curious position in which competing undertakings find themselves when under municipal management. It is an old question, with a mass of object-lessons clustering about it through the wordy battles that take place between committees in defence of the particular undertaking under their charge, seeing that final decision in most matters is the right of the council, and, according to the influence of the respective committees, decision is reduced to a partizan vote, with little, if any, consideration for the elements of the matter which should govern settlement. In practice, our contemporary says the condition of affairs ranges from passive truce to active jealousy. But it finds that almost invariably, the gas undertaking being the older of the two, the council are naturally inclined to administer its latest investment so as not to prejudice the stability of the earlier one. Our experience, on the other hand, is that, as a rule, the electricity undertaking is the petted and favoured child of the municipal family, and that the gas undertaking, though expected to contribute on an undiminishing scale profits in relief of the rates, is given the cold shoulder. "In a progressive electrical undertaking," says our contemporary, "the line of action is based upon a conviction that electricity is destined to oust gas completely in lighting, cooking, heating, and industrial power." Then what a number of fools there must be in electricity undertakings! In any event coal must be carbonized for the production of coke for various purposes, the production of tar for chemicals galore, dyes, disinfectants, requisites for ammunition, light oils, motor fuels, and much else, with the recovery of the ammonia, and so forth, all of which Nature in her great bountifulness has stored in the coal. In doing this, gas must be produced. Is the valuable heat energy of the gas to be wasted? We suppose the idea of those in charge of "progressive" electrical undertakings is that it must be in order to enlarge the scope of the lower thermal value electricity. We pity their intelligence on economic questions. However, after referring to a little dispute that there has been between certain Committees of the Walsall Town Council over a public lighting matter, our contemporary says: "The only serviceable plan is for each department to be free to put its own case to the public; and as the most effective publicity is that which states positive reasons without going out of its way to disparage the claims of opponents, there is no reason why commercial development of either gas or electricity supply should degenerate into undignified and barren controversy." This is the best point in the article; and we can heartily endorse it, with the one qualification that the case put before the public is based on truth.

The general meeting of the members of the Midland Association of Gas Engineers and Managers will be held in Birmingham, on Thursday, March 11. It is expected that the meeting of the Southern District Association of Gas Engineers and Managers will be held the same day at the Hotel Cecil, Strand, W.C.

THE DISPOSAL OF COKE.—Part I.

AND SOME MEANS FOR INCREASING ITS SALE.

By a Gas Engineer.

THE necessity for disposing of coke in the best market and at the best price has been growing greater year by year. The reasons to account for this fact are sufficiently obvious to require little explanation. The great popularity of gas-cookers and the growing demand for gas fires, geysers, hot-water circulators, gas engines and furnaces, and all the small trade appliances, which are so extensively pushed nowadays, not only cause more coal to be carbonized and more coke to be made, but they cut out of use coke-consuming appliances of one sort or another.

In London alone there must be not far short of 2 million gas stoves and fires in regular use. It needs little imagination to realize what a vast quantity of coke was at one time absorbed by the grates which have now been converted. It is true that the effect upon coal consumption has been infinitely greater than upon that of coke, and it is equally true that much of the additional gas made during this period of development has been provided by carburetted water-gas plant, which has in its turn absorbed a great deal of coke. At the same time it is an undoubted fact that while the coke available for sale has not decreased during the past decade, yet the demand for it has been growing substantially less year by year.

The adoption of electric motive power has been the means of shutting-down a large number of steam-boilers—many of them of the small vertical type, which is usually fired on coke. Of recent years the position has been rendered infinitely worse by the action of the cement companies in discarding the use of coke in favour of coal dust.

The decrease in coke consumption, which, as has already been shown, is due to certain easily explained reasons, has hitherto been kept under control by the policy of making carburetted water gas, which may be considered to be an admirable means of controlling the market. This policy has, however, certain disadvantages which are at times liable to upset and counteract all its good points. These may be classified as follows:

1.—Carburetted water gas is, on balance, more expensive to manufacture.
2.—It is liable to large fluctuations in cost, corresponding with variations in the price of oil.
3.—In supplying mixed gas the necessary variation in proportion upsets the uniformity of the gas, and consequently the working of gas appliances—a matter of ever-increasing importance.
4.—Carburetted water gas is not so valuable, now that calorific power rather than illuminating power is the greater consideration. [Coal gas of 14-candle power is equivalent in heating power to carburetted water gas of 17 to 18 candle power.]

These points are of sufficient importance to have caused gas engineers to consider well whether, if carburetted water gas must necessarily be made, the control of the coke market is not dearly bought.

The object of this series of articles is to review the various points of importance in conducting coke sales; to suggest methods of increasing such sales; and to assist in ventilating the whole question. The necessity of grappling firmly with this matter is daily growing greater; and it is accordingly hoped that the general discussion of coke matters will result in the giving of closer consideration to this vexed question.

THE NEED OF A DEFINITE POLICY.

It will be advisable to deal first with the requirements of the coke market, and then to discuss the best means of fulfilling these requirements. Coke is continually in competition with coal, and the producers of coke are likewise in constant competition with coal merchants; so that it is imperative that the question of coke should be kept well to the fore when the user is considering his purchases. It is not to the gas company's interests for coal, and coal only, to be offered to the buyer of fuel, but this, under the present conditions, is frequently the case. If the coal merchant can make a larger profit by selling coke than coal he will certainly push it; but this is rarely the case, for gas companies and corporations do not, as a general rule, follow any deliberate policy. They neither give the coal merchants attractive terms, nor do they adopt the alternative of energetically pushing their product themselves. Instead of this they so often make the mistake of taking a middle course, and give, on the one hand, the merchant a paltry discount, while, on the other hand, they attempt, in a half-hearted manner, to conduct coke sales direct with customers. This is obviously a faulty policy, for the giving of a small discount will only bring to the undertaking, *viâ* the coal merchant, the orders from customers who insist on being supplied with coke in preference to coal, and who would buy coke in any case. In these circumstances, justice is not done to the gas-works product; and unless coke is energetically advertised by the undertaking it will be totally neglected.

Therefore, a gas undertaking should follow a definite policy. By giving the local coal merchants as large a profit from coke as from coal, a considerable business can be, and is, done in many districts. At the same time, if good results are to be obtained, some amount of advertising must also be undertaken. The more extensive and skilful the propaganda, the more numerous will be the inquiries and orders. Besides, it is a general maxim that a widely-advertised article will always be stocked and, if stocked, pushed by the retailer—in this case the coal merchant. This policy is one which will enable a large business to be done at the cost of the minimum amount of trouble, work, and expense; and in many districts this is probably the best course to take. This will, of course, depend upon local conditions, the capacity of the management, the size of the undertaking, &c.

DIRECT SALES TO USERS.

If, on the other hand, a direct-sales business is conducted upon sound and energetic lines, there is no doubt that the sales of coke can be made to yield a higher return; for the merchants profits are saved, and some indirect financial benefits are, or should be, obtained. There are, too, substantial advantages in retaining control of an important branch of the business. Gas undertakings are compelled to make coke irrespective of the demand. It is, therefore, of special importance that the means of selling it should be in their own hands. In this way additional efforts can be made to coincide with additional stocks, and such course of action can be intelligently prearranged according to the change of seasons and the variation in the make of coke from one year to another. On the other hand, a merchant could not be expected to take account of such things, and would probably take undue advantage of large stocks to embarrass the gas undertaking by ceasing his efforts at the very moment when a great effort was needed. By this means merchants can, and in some cases do, rig the market to suit their own ends.

Assuming, therefore, that it is desired to conduct a large direct-sales business, and, further, that the laudable ambition is entertained of selling locally the whole of the coke production, it should be realized that a good deal of effort must be forthcoming. That it should be necessary to sell a large surplus outside the district, and inside the district of another undertaking which has taken a great deal of pains to build up a good local trade, casts a slur—and no light one at that—on the management. Few of those who have taken any pains to push the sales of coke, and who are, therefore, cognizant of the problem, will admit that there should be any need to invade another man's district.

It is obvious that, if the coke is sold drenched with water, laden with breeze, and if, further, it can only be supplied as made, without any properly arranged plan of delivering in units of a convenient size to suit the particular district, great difficulty will be experienced in disposing of even one-half the total production in the neighbourhood. The requirements of any district, so far as coke trade is concerned, are bound to vary considerably according to the nature of the district; but all districts will require coke of different sizes and as free as possible from water and breeze. Complaints as to quality nearly always refer to one or other of the latter defects, and, therefore, attention must be given, and, if necessary, alterations be made, to ensure that the coke contains the minimum quantity of water and breeze.

THE REQUIREMENTS OF COKE USERS.

Now, as to sizes, it would be difficult to improve upon those recommended by the London Coke Committee, and which are as follows:

No 1.—Large graded coke—over 2-inch square mesh.
2.—Broken or domestic coke—between 2-inch and ¾-inch square mesh.
3.—Forge coke—between ¾-inch and ⅜-inch square mesh.

New screening plant, unless there is some good reason to the contrary, should be arranged to provide these sizes; while, as regards existing screens, some consideration should be given to the question whether at the first opportunity alterations to these sizes should not be made, as in the future it is probable that these grades will become standardized, and be specified by buyers generally. The provision of facilities for supplying coke of such varying sizes should be considered an absolute necessity if the marketing of the product is to be given a fair opportunity.

The cream of the coke trade will be the purchases made by the domestic and other small user, who, to obtain satisfaction, should always be persuaded to buy broken coke. If, owing to the extent of the additional charge made for this size, or if, owing to the fact that the proper recommendation is not freely and constantly made and widely advertised, the customer buys large coke for domestic and similar uses, it will almost certainly end in failure to give satisfaction. Large coke is far from being a suitable article for use in household grates, whether it be in the kitchen or sitting room. If, therefore, large coke is supplied for such purposes, it is unlikely to lead to repeat orders, and will most assuredly end in giving coke a bad reputation as a domestic fuel.

The best advice is, therefore, to supply broken coke at absolutely the lowest price above that charged for unbroken coke, and to strongly advise its use for domestic purposes in all literature and advertisements, and in interviews with customers, many of whom are accustomed to question the "gas man" on such matters, and who should, therefore, be made acquainted with the company's policy in this respect. This point as to the exclusive

(if possible) supply of broken coke for domestic use cannot be too strongly emphasized.

Price of Broken Coke.

In determining the additional price to be charged for broken coke, account must be taken of the cost of handling and the amount of breeze made in breaking. But in many works the coke as it comes from the retort-house is screened into the required number of sizes; and in this way the broken, or rather screened, coke is obtained. Where this is the case, there is no justification for charging any additional price for such coke, but there is ample justification for asserting that all works of a sufficient size should be provided with plant for dealing with the coke in this way. If it is possible to supply broken coke at the same price as unbroken coke—and every available means should be adopted to render it possible—then the battle will be already half won; for the foundation of every business must always be to supply the right article at the right price. At least one large gas undertaking, which is well known for the skill with which it conducts its coke business, has adopted the deliberate policy of supplying broken and unbroken coke, and other sizes as well, at the same price; and it needs but little foresight to prophesy that the future will prove that this is the right policy.

Mr. Robert Watson, of Doncaster, in an interesting paper read before the Manchester District Institution of Gas Engineers, on "The Make and Sale of Coke" [see "Journal," March 2, 1909, p. 615], gave figures to show that the ability to sell the whole of the coke production in a district largely depended upon whether or not broken coke was available for sale at the works. Unless this is done, a large portion of the local trade cannot be tapped at all. Therefore if a good local trade is to be done, it must be considered a *sine quâ non* that broken coke should be supplied, and proper means be provided to deliver it in the district in small quantities. Further, in no case should it be sold at a higher rate than will recoup the gas-works for the cost of breaking it.

Coke Nuts.

In all districts there will be some demand for a smaller size of coke [No. 3 forge coke, from $\frac{3}{8}$-inch to $\frac{3}{4}$-inch square mesh, as specified by the London Coke Committee] for smithy fires, small hot-water and greenhouse stoves, and other small stoves and appliances for which broken coke of the usual size is too large. If this demand is met, as can quite easily be done, the local market is thereby widened, and the possible quantity of coke which can be absorbed in the particular district is increased. Quite recently it has been shown that coke of this size ($\frac{3}{4}$ inch to $\frac{3}{8}$ inch) is especially suitable for burning, when mixed with coal, on the mechanical grates of boilers. By this means cheaper coal can be used, and less smoke produced; but for this purpose coke requires to be of the size specified, and certainly not more than of 1-inch cubic capacity, as these mechanical grates are constructed to use small coal only, and are not adaptable for fuel of large size, which would clog the working parts.

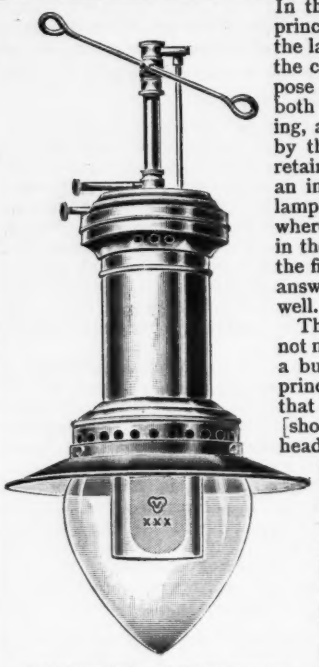
Coke for Gas Plants.

Small coke of this size, and broken coke as well, is sometimes used for suction and producer-gas plants; but neither grade is really suitable—one being too small and the other too large—although this statement would not apply to large producers, which would require broken coke. In industrial districts a considerable demand can be created for this purpose; but, as the London Coke Committee point out, coke for these plants should be broken and graded approximately to $\frac{3}{4}$ inch or 1 inch. It is also very important that this coke should be free from dust and breeze and tarry pieces from the retort mouthpieces. It is, therefore, seen that some care must be taken to provide the right article. Gas undertakings must, however, remember that the suppliers of anthracite have taken indefatigable pains to screen and supply this fuel in the exact size required, and free from dust. Consequently, if coke is to invade this market with real success, equal trouble must be taken to fulfil the somewhat exacting requirements.

FALK, STADELMANN, AND CO.'S NEW LAMPS.

Some days ago, the writer, on calling at the Veritas Lamp Works of Messrs. Falk, Stadelmann, and Co., in Farringdon Road, E.C., had his attention drawn to a very attractive-looking little fitting intended—and eminently suitable—for the lighting of shops, showrooms, restaurants, public rooms, and large interiors generally. This new comer has been named the "Veritas Stellux" high-candle power low-pressure lamp; and it may in a sense be termed a "child of the war." That is to say, it really owes its existence to the European conflagration, as the facts of the case prove. It was the experience of the firm that the 300-candle power low-pressure type of lamp imported from the Continent before the war was only too apt to possess a weak point in the lightness of the burner parts, which, when made up of several pieces of thin brass tube, perished with the heat. Cheapness, of course, was the object of this; for at that time sentiment was as a rule altogether subservient to considerations of price. The outbreak of war, however, and the consequent cutting-off of supplies from abroad, afforded, as everyone knows, a first-class opportunity of extending the manufacture of good British articles to take their place; and if the price should be a little higher, the additional amount is generally cheerfully paid.

Taking advantage of this opportunity, Messrs. Falk, Stadelmann, and Co. have designed a British lamp which, while moderate in price, embodies improvements in detail which they have found to be lacking in Continental patterns. In the first place, the burner-tube, instead of being, as was often the case, in four pieces, is in two parts. The bunsen chamber and tube are made in one piece of extra heavy cast brass, to withstand the great heat; while the extension-tube is another piece of cast brass, and is fitted with a mixing-chamber of solid drawn brass. This it is said will give several times the life of the thinner tubes already referred to.



"Veritas Stellux" High Candle-Power Lamp.

In the matter of appearance the principal distinguishing feature of the lamp is the material of which the casing is made. For this purpose aluminium has been chosen—both because it is "dressy" looking, and because it is not affected by the heat. That they should retain their bright appearance is an important point in regard to lamps installed (say) in shops, where they may be seen even more in the daylight than at night, and the firm find that aluminium does answer this requirement extremely well.

This aluminium casing, too, is not merely a casing which encloses a burner. It is a "lamp with a principle;" and the principle is that air is drawn in through ports [shown in the illustration] in the head of the casing, into a gallery which opens into a transverse box, round which the products of combustion play, and so thoroughly heat the air inside. The transverse box, in its turn, has holes leading to the burner tube; and through these the preheated air supply passes. Thus the heated air is completely protected from the products of combustion arising from the burner. The extension-tube at the top of the casing is aluminium painted, and the cock is nickel-plated. The air-intake is regulated by a double brass shutter enclosing the air-chamber; while the gas-adjuster is of the continuous movement type. An illuminating power of 300 candles is claimed, with a consumption of 7 cubic feet of gas per hour; and the lamp can be had either with or without reflector. A point to be considered in connection with maintenance is that the globe, the inner chimney, and the mantle are of standard dimensions, so as to be interchangeable.

A word or two may also be said with reference to the firm's well-known "Ukay" outside and large interior lamps, the range of which has been added to by the provision of a pattern with a superheater, to obtain a regenerative effect and increased flame temperature, with consequent higher efficiency. This has four No. 2 mantles run off one injector, and simultaneously adjusted by one gas and air regulator. Besides this, there has also been introduced a high-candle power lamp of one, two, and three lights, giving 300, 600, and 1000 candle power respectively. A further addition to the range is an indoor lamp; and here, again, there is being used an aluminium body—or white enamelled steel, if preferred. There are no inner glasses to any of these patterns, except the high-candle power type. All the lamps here referred to follow out the "Improved Ukay" lamp, with the removable gas-nipple, which was described in the "Journal" for Sept. 2, 1913 [p. 608]. This can be taken out bodily—not the adjusting needle only—from the outside, so that any obstructing substance carried forward with the gas can be readily cleared out on the spot. This is a feature which has evidently brought a lot of popularity to the lamp; for it is stated that the demand has gone up greatly since its introduction. The air-adjuster is also of a distinctive kind—consisting, as it does, of a sliding liner, which is adjusted towards or away from the gas injector. This is in place of the usual moveable sleeve; and the object is to avoid any check to the intake, which it successfully does. All this series of lamps, it may be said in conclusion, are, and always have been, British made.

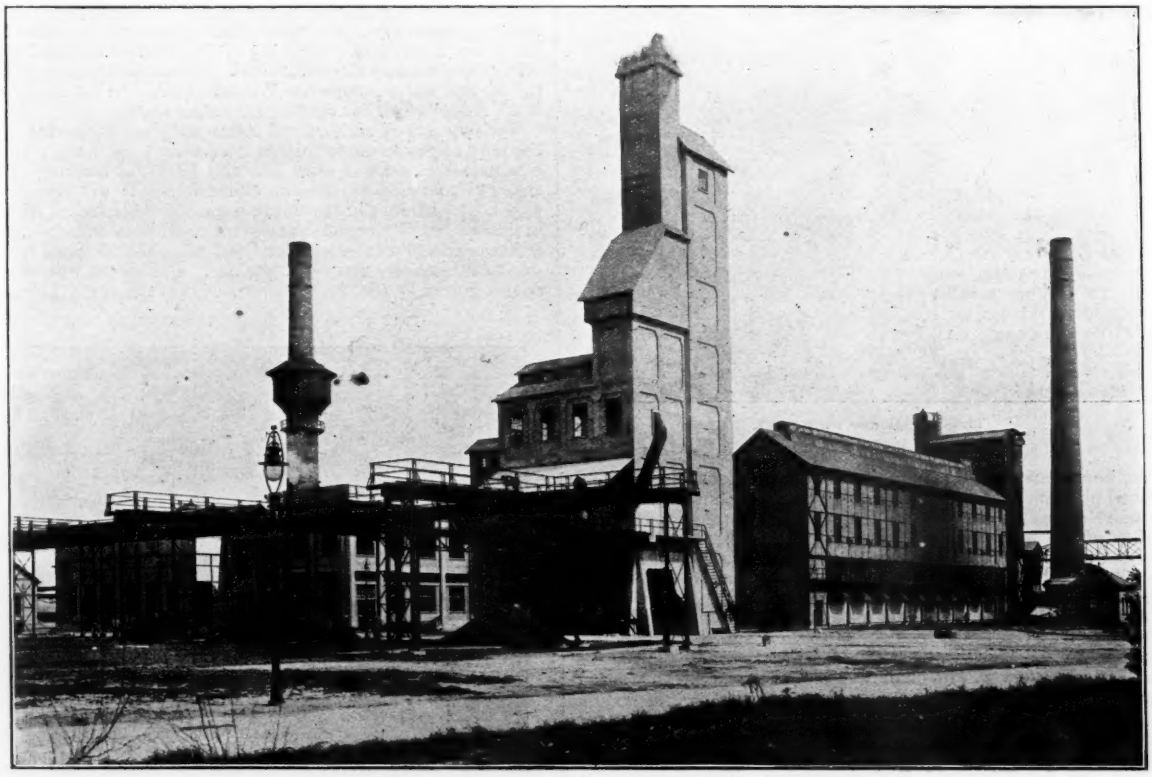
Industrial Efficiency of Coke.—The subject of the industrial efficiency and the economy resulting from the use of coke was recently dealt with by Mr. Charles N. Turner, the Traffic Sales Manager of the Milwaukee (Wis.) Coke and Gas Company. In the course of his remarks, he said: "The great industries of the country are becoming converted to the use of coke. The discoveries by Government tests that this product is capable of producing much greater heating efficiency than the mother product, and the fact that the tests have proved its use to mean a saving of 21½ per cent. on a basis of prices, have given its popularity an impetus which means that in the future coal may be recognized only as a raw product."

THE NEW KEILEHAVEN GAS-WORKS AT ROTTERDAM.

At a Meeting of the Royal Dutch Institute of Engineers, Heer M. C. Sissingh, the Director and General Manager of the Rotterdam Gas-Works, submitted a long paper on the new Keilehaven works. It has been published in the "Ingenieur," and from it the following particulars are taken.

Historical.

The historical records of the Rotterdam gas supply show that the first gas-works were erected in the year 1825, under a concession held by MM. L. Roelant and Co., of Ghent, and that they came into possession of the Imperial Continental Gas Association. In the year 1854 other works were erected, at the Oost-Zeedyk, by the New Rotterdam Gas Company. Both these works supplied gas on the right bank of the Maes. In 1878 the Municipality of Rotterdam erected gas-works on the left bank of the river. There were consequently then three gas-works under different owners. In 1884 the town bought the Oost-Zeedyk works and distributing plant, pulled down the works, and built new ones on the same site. In 1887 the concession held by the Imperial Continental Gas Association expired, and their works were then taken over by the Municipality. In 1897-8 the left bank works were furnished with water-gas plant; and in the year 1902 the Oost-Zeedyk works were considerably extended, and equipped with mechanical appliances and carburetted water-gas plant. Since the year 1906 Rotterdam has consequently been supplied with gas from two works, one on either side of the Maes. The Oost-Zeedyk works have a maximum capacity of 225,000 cubic metres (7,875,000 cubic feet) per diem, against a maximum output of 20,000 cubic metres (706,000 cubic feet), for the Teyenoord (left bank) works.



COKE-HOUSE, WITH CONCRETE SHAFT AND OVEN-HOUSE.

General Remarks on the Works.

The site of the Oost-Zeedyk works being fully occupied, and further extensions of plant being impossible, the increasing demand for gas necessitated the construction of new works at a place affording sufficient room for future enlargement. The choice fell on a site at the Keilehaven, on the outskirts of the town, where there is both railway and deep-water connection. The 28·4 acres of ground selected allow of the erection of gas-works of 2100 million cubic feet annual output.

The location of the different portions of the plant has been directed by the course taken by the gas from its production to its delivery. This is also the case with the chief raw material, coal, the principal bye-product, coke, and the other products, tar and ammonia. The water-gas plant is erected near the coke-store; and so is the boiler-house. Thus the road for the transport of the fuel in both directions is as short as possible. The boiler-house occupies a central position with regard to all the plant using steam—viz., the engine-room, the generator-room for the water-gas plant, the exhauster-house, the water-supply house, and the sulphate-works. Between the exhauster-house and the water-supply house space is left for eventually putting up a central electricity station. The workshops are situated in the centre of the works, near the plant which frequently needs repairing. In the vicinity of the sulphate-works, the retort-house, and the water-gas plant are the laboratories.

The coal storage and loading and unloading ground is connected to the works by sidings of normal width, so that it is possible to transport to every point by railway all the materials delivered by water at the docks, and in the same way to remove all bye-products, refuse, &c. There is likewise a junction to the railway system of the Dutch railways, so that all materials can be brought in from this side also. For the transport of coal there is an elevated track running from the docks over the storage ground to the retort-house.

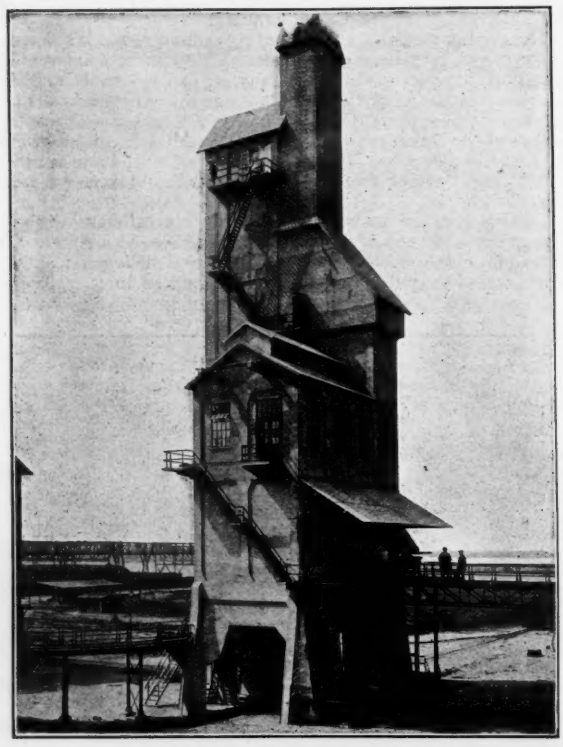
The result of the arrangement of the works is that all the buildings are grouped round two squares and alongside a street. The first square is where the coke is stored and delivered; and the admission of the public to the works is limited to it. Here the workmen's wives may bring their husbands' food, and the suppliers of goods deliver their wares for the workshops or stores. The second square is for the delivery by railway of all the bye-products, with the exception of coke.

The Carbonizing Plant.

It need scarcely be stated that the various systems of carbonization were carefully studied before a decision was come to with regard to the method to be adopted in the new works. Consequently extended trials were made at the Oost-Zeedyk works, first with a modified type of Settle-Padfield retorts with continuous charging, and afterwards with a Klönne horizontal chamber-oven. The results of these trials led to the selection of the latter. The house contains ten ovens with four chambers each, capable of taking a charge of 4·25 tons of coal. It is therefore possible to carbonize 170 tons of coal in 24 hours, which means a daily capacity of 1,904,000 cubic feet of gas; the yield per ton of coal being, on an average, 11,200 cubic feet. Each oven has its own generator, built in front, and under the oven the system of channels serves for the preheating of the primary and secondary air. The chambers are 20 feet long, 8 feet high, and, on an average, 16 inches wide. There are two outlet-pipes, connected to the ascension-pipe. At the front and back the chambers are closed by iron doors; the front having a special opening, with separate doors, to allow of entrance. The chambers have two mouthpieces, also closed by doors, for the supply of coal.

The filling of the chambers is done by means of a carriage

suspended on a rail above, and travelling over the full length of the set. The capacity of the carriage is equal to that of one chamber. The conical heaps of coal caused by its discharge into the chamber are levelled by a ram. For emptying the chambers, the door at the front is raised by mechanism attached to the discharging-machine. The back door is also raised by corresponding mechanism connected to a special carriage. The principal feature of the discharging-machine is the ram that pushes the cake of coke through the chamber. At the back the coke is conducted by an iron plate on the discharging car in such a way



The Coke-House with Shaft.

that immediately after leaving the chamber it falls along an inclined plate into the receiving car. The discharging car is suspended on rails. This construction is the outcome of a long study of the best method of discharging coke; and it forms a special feature of the carbonizing plant. The iron plates along which the coke slides when falling from the chambers into the receiving car are partly movable and counterbalanced by weights. When there is no discharge of coke, the position is horizontal, and then they rest on bolts attached to the frame of the building. In this position they form a path along the oven, and allow of the inspection of the separate chambers as well as the carrying out of the necessary repairs and the removal of clinker.

The frame of the building has been kept entirely free from the construction work of the ovens. Horizontal portions of the frame carry the dip-pipes, foul mains, tar-conduits, and the rails upon which run the filling and discharging cars. This construction allows free expansion of the oven-work. The building containing the bunker coal is immediately connected to one side of the oven-house. The bunker has a capacity of 8400 cubic feet, and is supplied by means of two bucket conveyors. The charging car is filled directly from the bunker. In the corner made by the oven and bunker buildings the condenser has been constructed. It consists of two parts—an air and a water condenser. The former is simply a sheet-iron tube, 9 ft. 4 in. diameter and 63 feet high.

The Coke-House.

For the quenching of the coke there has been adopted a method which is the result of much study. The coke discharged from the chambers falls into a truck consisting of a framework of heavy iron and iron bars; the whole forming a kind of iron basket easily permeable by water. The capacity of the truck is about 283 cubic feet. A small locomotive moves the truck to the platform of a lift. Under the platform there is a concrete trough filled with water, into which the truck is sunk as soon as it has reached the platform. The hot coke is quenched by the water, and the resulting steam is carried away by a high concrete shaft. As soon as the coke is quenched, the truck is lifted to the top of the shaft, where it is discharged into a storage-bin next to the shaft in the top of the coke-house. The entire handling of the coke is finished within ten minutes, in which time 3 tons of coke are treated, and the truck is ready for the next load. The coke-house is constructed entirely of concrete. The ground floor has a gate which allows of the entrance of railway waggons and small trucks. Above the gate are the bins for the various sizes of coke, and still higher are the coke breaking and screening arrangements. The building is 143 feet high from the ground level.

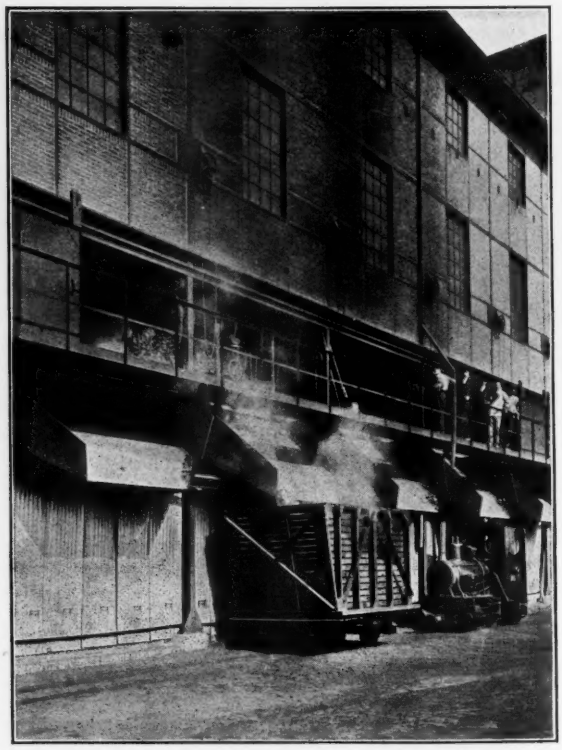
There are four bins, each containing a different size of coke. The bins may be discharged from a height of 23 feet above the ground into small trucks running on rails laid on the coke-bridge, whence they are transported to the coke-ground. The four bins have also devices for discharging the coke into bags for sale in town, into railway waggons placed under the gate, and into small trucks for the supply of the water-gas plant.

Water-Gas Plant.

This plant produces carburetted water gas; but the apparatus differs from the type generally constructed by Messrs. Humphreys and Glasgow. In the first place, it is on the double-generator system, which was the one mostly employed on the Oost-Zeedyk works. Then use has been made of the cellars under the house for collecting the clinkers from the generators in small trucks running on the floor rails. The trucks are moved along to a lift, which takes them outside the building. By this means there is no trouble inside from steam caused by the quenching. For controlling the process of gas production, the air-supply pipes to the generators have Venturi meters, the steam-supply pipes have steam-meters, and in the superheaters there are pyrometers. Each generator has its coke-weighing machine.

The possibility of future extensions being required led to several buildings being constructed with adequate space for carrying them out. With the same view the engine-house was constructed with two floors. On the ground floor are the exhausters, on the first floor the blowers, and in the cellars the oil-pumps, the circulating water-pumps, and the various pipes and conduits. The blowers are enclosed. They are of the Sturtevant make, and are driven by De Laval steam-turbines. The exhausters are ordinary; the oil and water pumps are Worthington's. In the engine-room is a "Selas" plant for lighting the entire works.

The two sets of carburetted water-gas plant have each a daily capacity of 30,000 cubic metres (1,060,000 cubic feet). There is adequate space for a third set, and then the building may be enlarged to twice its present dimensions. It will therefore be possible to produce in the future 6,300,000 cubic feet of water gas in this space. The condensing plant consists of three water-tube condensers and a tar-separator; and there is still space for three similar condensers and one separator. Connected with the condenser-house is the boiler-house, where are three Lancashire



Discharging Red-Hot Coke from the Chamber Ovens into Openwork Trucks.

boilers with adequate space for seven more. The fuel is supplied to the boiler-house by a bucket conveyor discharging into high-level bins.

Behind the water-gas works is the "cyclone," for separating the tar from the gas, and the separator for removing the tar from the wash-water. Here also are the tanks for water-gas tar. Farther behind are placed the relief holder and two oil-tanks. The holder is on the modified Intze system, with a partially conical and partially dome-shaped accessible bottom. The space under the tanks is insulated with asbestos cement, and provided

with steam heating to prevent the formation of ice in the tanks. The two tanks are surrounded by a wall of concrete.

Exhausting and Purifying Plant.

In the exhauster-room there have been placed two exhausters for coal gas; and there is room for six.

In the building in which wet purification is carried on there are one tar-separator, one naphthalene washer, two tubular condensers, and one ammonia washer; while space is reserved for the installation of a cyanogen washer. There is ample room for a second series of similar apparatus. Each washer is separately driven by an electro-motor. In the immediate neighbourhood of the building are placed the liquor-tanks.

There are two separate buildings for carrying on dry purification—one for coal gas and the other for water gas. The purifying-house for coal gas is furnished with four boxes, though three are sufficient for the present production. Care has been taken to allow for future extension. The building may be lengthened so as to take twice the present number of boxes. These are so constructed as to allow of the height being increased by 20 inches. The boxes are now 6 ft. 8 in. deep, and have a superficial area of 23 ft. 4 in. by 26 ft. 8 in. They are fitted with hurdles, and their capacity is sufficient to enable them to take 80 metric tons of the purifying material. They are placed on mounted slabs of armoured concrete, so that the space underneath is available for the revivification of the oxide. For raising the covers there is a travelling crane, which is also used for filling the boxes. For this purpose it has a device with four drums, allowing the simultaneous handling of 2 metric tons of oxide. The boxes are emptied through eight holes, closed by doors, in the sides.

The purifying-house for water gas is of the same construction as that for coal gas; but there are only three boxes.

Meter and Governor House.

This building contains two station meters, one for coal gas and the other for water gas, each of a capacity of 3½ million cubic feet per diem. There is also the meter which registers the consumption of gas on the works. For regulating the pressure of gas in the town there are two governors in series, and one for controlling the pressure on the works. There is room for another governor for the first-named purpose. In this house is installed the Roots blower for pumping gas under high pressure to the Oost-Zeedyk works or to the distributing system. It is driven by an electro-motor, and has a capacity of 350,000 cubic feet per hour under a water pressure of 16 inches.

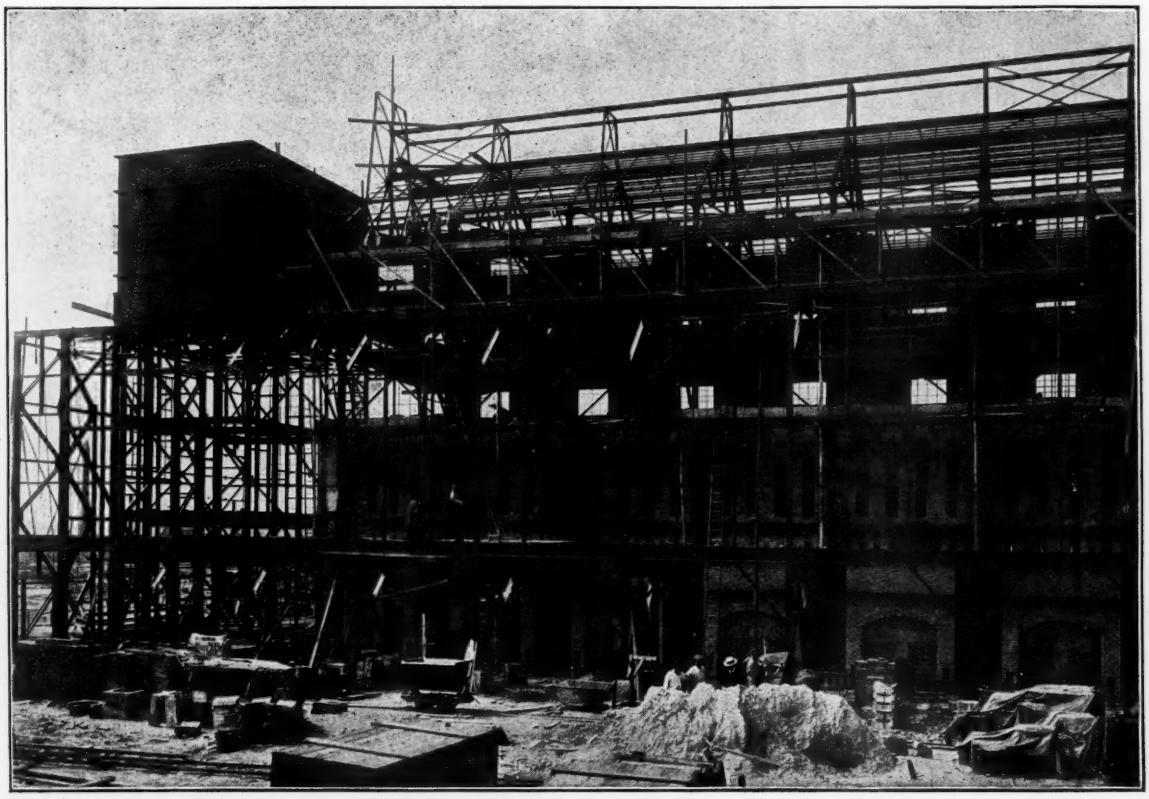
Storage Plant.

The gasholder of 2,625,000 cubic feet capacity, is on the ordinary tank system. The foundation is a bed of reinforced concrete, 14 inches thick, resting on piles. There is an outer ring wall made of this material, and the inner space formed thereby is filled with sand to a height of 5 ft. 6 in. The upper level is covered with a layer of breeze and tar, on which the tank rests. Around the ring wall is kept free a low-level path connected to a sewer in such a way that the tank is always dry. The diameter of the tank is 180 feet. The holder has four lifts, guided by tangential rollers—the guide-framing being on the Klönne system. The relief holder is constructed and placed similarly to the large holder; and the guiding is on the same system. The diameter of the tank is 53 feet.

Sulphate Plant.

This plant consists of two sets, each capable of dealing with 40 metric tons of ammoniacal liquor in 24 hours. But there is room for extension, so that it will eventually be possible to treat 160 tons of liquor per day. Each apparatus consists of a distilling column, an economizer for preheating the liquor by the exhausted liquor, and a saturator. This is of iron covered with lead. The saturators are adequate to taking the products from the 80 metric tons of liquor, and the pipe connections will allow of two columns working on one saturator. The salt is removed by a steam-driven ejector, and afterwards dried centrifugally. The sulphate building contains two overhead liquor tanks and an overhead sulphuric acid tank, as well as an air-compressor for emptying the tank trucks into the acid-tank.

The exit gases are first cooled in a condenser, afterwards pass through a double purifying-box, and eventually flow into the chimney. The box is mechanically handled, as is the case with the boxes in the coal gas purifier-house.



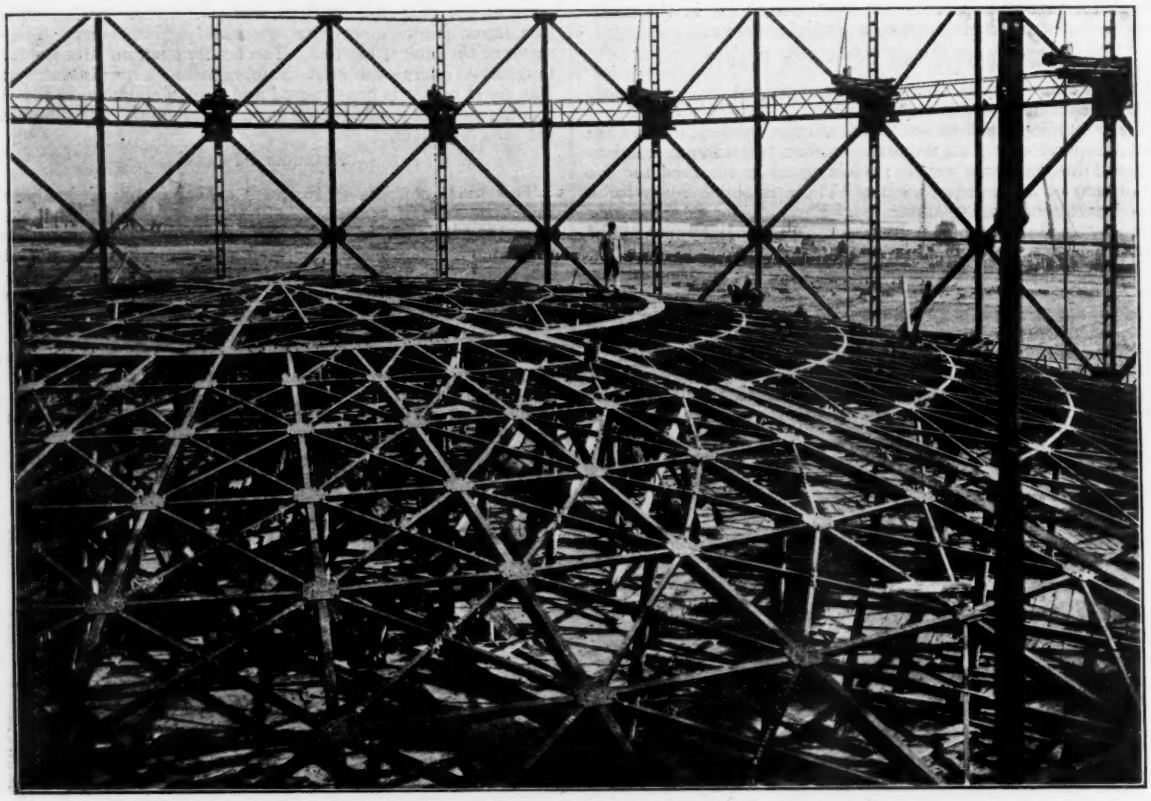
THE CHAMBER-OVENS BEING BUILT.

Coal-Handling Plant.

This plant consists of three portions: (1) The plant for unloading ships and the transport of coal to or from the yard; (2) the plant for transporting coal from the unloading stage to the retort-house or from the coal yard to the house; and (3) the breakers and the plant for the transport of the coal to the storage bunkers in the retort-house.

The unloading and handling plant is provided with electrically driven jib travelling cranes, suspended railway, and bucket conveyors. It is calculated for an initial hourly handling capacity of at least 50 metric tons of coal, increasing to 100 tons. The transport railway is calculated for handling 150 tons of coal per hour, and the bucket conveyor 50 tons in the same time. The crane for unloading ships has a maximum hourly capacity of 124 metric tons; but on an average it will deal with 70 tons. The crab will take 2·4 tons. The lifting speed is 3 ft. 3 in. per second; and the travelling velocity of the whole is 65 ft. 6 in. per second. The bridge of the crane has a storage-bin adequate to take 20 tons of coal. This bin has a delivering device with shoot for filling the skips of the transport railway.

Over the coal yard is a travelling bridge with a crane like the unloading crane. The height of the bridge above the railway is 19 ft. 4 in. This bridge-railway is 330 feet long, with provision for extension. The stack of coal may be 16 ft. 8 in. in height and 213 feet wide—giving a bulk of about 20,000 tons. The overhead railway for the transport of coal is furnished with the automatic



THE ROTTERDAM GASHOLDER IN COURSE OF CONSTRUCTION.

block system for the prevention of collisions. The skips have a capacity of 105 cubic feet, and they all discharge at the bottom. Each skip has an enclosed electro-motor, and the speed is 3 ft. 3 in. per second. The energy is direct current of 110 volts pressure, generated in two transformers using rotary current of 220 volts and 50 periods per second. Each transformer has a capacity of 25 kilowatts.

The transport of the coals may be carried out in three ways: (1) The coals are emptied from the bin on the crane bridge at the docks into the skips of the overhead railway. They are weighed on the weighing bridge, and delivered into the bunker near the south end of the retort-house. The empty skip returns to the starting-point. All is controlled by one man. The weighing, registering, and numbering of the skips are entirely automatic. (2) The skips are emptied at any place required along the coal-yard bridge. (3) The coals are emptied from a bunker on the coal-yard bridge, and their subsequent progress is according to the first method.

Electricity Plant.

For power as well as for light, partial use is made of electricity in the Keilehaven Gas-Works. It is employed more particularly in the case of the engines and plant which work intermittently, and also for the installations where space or distance renders electric current preferable to gas or steam. Electric lighting is used in rooms where explosive gases may be present. The current supplied from the municipal electricity works is direct, of an average pressure of 550 volts, as employed for the tramways, and rotary current of 5000 volts and 50 periods per second. To the direct-current lines are connected only the coal transport cranes and a 2½-ton crane—giving together 594 H.P. nominal. All the other appliances are connected to the rotary current. For this purpose the high-pressure current is transformed on the works to 220 volts. The current is supplied to the high-pressure portion of the switching system through two cables, each more than sufficient for the works. In the high-pressure room there is space for five transformers; but up to now there have been installed only two, each of 100 units, for power, and one, of about 20 units, for lighting. From these transformers the low-pressure current is conveyed to the central switchboard. The horse power on the rotary current cables is upwards of 406. For the electric overhead railway direct current at 110 volts is used. This current is produced on the works by two motor-generators driven by rotary current motors of 40 H.P.

Water Supply.

The gas-works have their own water supply; only that used for drinking being taken from the municipal service. The water for general use is furnished by two wells, each having a productive capacity of about 6670 gallons per hour, connected to a 9-inch suction-pipe. The water is treated for the removal of soluble iron salts, and then filtered through lava and quartz.

WATER LEGISLATION FOR 1915.

Provisional Orders.

In the last number of the "Journal" the provisions in regard to the supply of water in the Bills promoted by companies and local authorities were dealt with. We now notice those contained in the Provisional Orders—taking first those for which applications have been made to the Board of Trade.

The Fisherton Anger and Bemerton Water Company wish to increase their capital, and they apply for authority to create 2000 preference and 1800 ordinary shares of £1 each; the dividend on the former to be at the rate of 4½ and on the latter 5 per cent. per annum. The new ordinary shares are to vest in the shareholders in the proportion of six for every £10 share in the existing capital held by them; and they are to be deemed to be fully paid, and accepted in full satisfaction of their interests in the undivided profits of the Company, and their right to have the deficiency of previous dividends made up to the amount of the profits. In addition to the existing and the new capital, the Company require authority to raise additional capital not exceeding £700 in shares or stock of not less nominal value than £1; but they are not to vest in the person accepting them until not less than one-fifth of the amount of the share or stock has been paid in respect of it. Confirmation is sought for the issue of the £2450 of 3½ per cent. debenture stock said to have been issued by the Company; and notwithstanding that it was in excess of the amount authorized by their 1867 Act, it is to be deemed to have been legally created. [*Parliamentary Agents: Messrs. Taylor, Hoare, and Jelf.*]

By the Order granted to the Hoylake and West Kirby Gas and Water Company in 1906 they were empowered to borrow to the extent of one-fourth of the capital. They are now applying to have the limit increased to one-third, the interest upon it to be 5 instead of 4 per cent. Among the general provisions of the Order is one authorizing the Company to charge an additional sum not exceeding 21s. per annum where domestic water is used by means of a hose-pipe for stable purposes; and another enabling them to sell meters and fittings, and to remove them from premises in which they have been installed. [*Parliamentary Agents: Messrs. Torr, Durnford, and Co.*]

The Thirsk District Water Company, Limited, require authority to extend their limits of supply so as to include the townships or parishes of Kepwick, Cowesby, and Kirby Knowle, all in the rural district of Thirsk, in the North Riding of the county of York. They also wish for power to construct additional works, consisting of a receiving chamber on Kepwick Moor, and an aqueduct connecting it with Felixkirk. The new works are to be completed within the time, and subject to the conditions, prescribed by section 11 of the Gas and Water Works Facilities Act, 1870; and the undertakers wish to carry out extensions and renewals, and lay down extra lines of pipes along the route of the

aqueduct previously mentioned. Further capital is needed to the amount of £6000, including premium. The entire share capital is not to exceed £38,000, unless the undertakers are hereafter authorized to increase it. The dividend on the new capital is limited to 7 per cent. if issued as ordinary, or 6 per cent. if as preference. Authority is required to borrow not more than £2000 in respect of the capital sanctioned by the Company's Orders of 1879 and 1884, and any sum not exceeding one-third of the new capital to be raised under the present Order, and it is not to carry a higher rate of interest than 5 per cent. per annum, without the consent of the Board of Trade. The undertakers apply for power to make bye-laws for preventing waste of water, and to require water for farming purposes to be taken by meter; but they are not to refuse a supply at the rates authorized for domestic purposes under their Order of 1879. The price of water supplied by meter within the limits is not to exceed 2s. per 1000 gallons. For water supplied for building purposes, the undertakers wish to be authorized to charge either a rate not exceeding 7s. 6d. per cent. on the contract price of the building, or 1s. 6d. per pound of its rent or annual value. [*Parliamentary Agents: Messrs. Rees and Freres.*]

The following applications have been made to the Secretary for Scotland, under the Private Legislation Procedure (Scotland) Act, 1899.

The Clackmannan County (Alloa and Tillicoultry) Water Order is to authorize the County Council of Clackmannan to construct water-works for the supply of the Alloa and Tillicoultry Special Water District. The water is to be obtained from the Loss or Craigencash Burn, in the parish of Logie and county of Stirling, by raising the embankment of the existing reservoir; and the other works consist of an intake on the Inchna Burn, filters and a tank situate at Lipney, and four aqueducts or pipe-lines. If the intake on the Inchna Burn is not completed within ten years, the powers granted for making it are to cease, except, of course, as to the finished portion. The new supply is to be used by the Council primarily for satisfying the domestic and sanitary requirements of the district; but they wish to be empowered to sell any surplus water for other purposes within the district, and for general purposes in any other part of the county. The usual powers in regard to water supply are required, as well as authority to apply existing funds for the purposes of the Order. [*Parliamentary Agents: Messrs. Grahames and Co.*]

Authority is applied for by the Glasgow Corporation for the construction of additional water-works, consisting of an impounding reservoir on the River Turk, and an aqueduct for conveying the water therefrom to Loch Katrine; also two railways, a new road, and an alteration in the level of one already existing. Ten years are required for completing these works. It is proposed to abstract water from the above-named river and from Finglas Water, as well as from all springs and streams flowing into them, or intercepted by the intended works. The Order contains a number of provisions for preserving the purity and preventing the fouling of the water. The Corporation apply for power to hold lands for the protection of the water-works, and to plant with trees any land in their possession in connection with their water undertaking which may be considered suitable for afforestation. Authority is sought for raising any sum not exceeding £400,000 in addition to the £4,300,000 sanctioned by the Water Acts of the Corporation. [*Parliamentary Agents: Messrs. Martin and Co.*]

The Irvine and District Water Board are seeking authority for the construction of additional works, consisting of a reservoir, a catchwater, an embankment across the Drum Burn, an aqueduct, and an access road, all in the county of Ayr. It is proposed to impound the waters of the Drum Burn, the Caaf Water, and the Bradshaw Burn, and all or any of the springs or streams flowing into them. Ten years are required for the completion of the works, for the construction of which authority is sought for borrowing £70,000, as well as £30,000 for the general purposes of the undertaking, to be repaid in sixty and fifty years respectively.

In another Order the Board apply for authority to construct a conduit or pipe-line in the parishes of Dalry and Largs, and to make agreements with the Corporation of Paisley for the supply of water in bulk. The proposed conduit is for the use of Nobel's Explosives Company, Limited, who will bear the cost; but provision is made for the repayment to them of a reasonable proportion of their outlay, in the event of the conduit being used by the Board after the expiration of three years from the completion of the reservoir and other works comprised in the Order previously noticed. The Board ask permission to raise £30,000 for the construction of filters and other works, and for the general purposes of the undertaking; also such amount as may be necessary for repaying to the Company the proportion of their outlay upon the conduit to which reference has just been made—fifty years being required in each case for their repayment. Ten years are required for the completion of the works. [*Parliamentary Agents: Messrs. Grahames and Co.*]

The gas portion of the Order applied for by the Lanarkshire County Council was noticed in the "JOURNAL" for the 19th ult. (p. 135). In the water portion, the Council wish for authority to be conferred upon the District Committee of the Middle Ward to construct a service reservoir in the parish of Cumbernauld, eight aqueducts or pipe-lines, and a railway, to be completed within five years. It is proposed to include a portion of the county of Dumbarton within the water limits of the District Committee; and the Order contains full provisions in regard to the rates and charges to be levied therein. Authority is required by the Council to borrow money for the purposes of the Order; but the total to be raised under their Water Acts and the Order is not to exceed £1,190,000. [*Parliamentary Agents: Messrs. Grahames and Co.*]

THE FRACTIONAL COMBUSTION OF GAS OVER COPPER OXIDE.

By E. TERRES and E. MAUGUIN.

The following is an abstract translation of a contribution on this subject to the "Journal für Gasbeleuchtung" for Jan. 2. It is a record of work done at the instance of Professor H. Bunte at the Chemical Technical Institute of the Technical College at Carlsruhe.

The volumetric method is the simplest and, for most cases, a sufficiently exact method of analysis of gases; but in special cases, as, for instance, where small quantities of combustible constituents have to be estimated, the volumetric method becomes inapplicable, and gravimetric methods have to be adopted.

There are three gravimetric methods—viz.: (1) Fractional combustion as carried out by Bunte-Haber-Weber over palladium asbestos at about 400° C. and a Drehschmidt platinum capillary at a red heat. (2) Fractional combustion over copper oxide. (3) Total combustion over copper oxide or in the Drehschmidt platinum capillary at a red heat. Stöckmann has shown that if the volume is exactly measured before and after combustion the qualitative composition of the gas under examination may be deduced from the analysis.

The degree of exactness of the first method has been investigated by Haber and Weber, and that of the third depends purely on precise measurements of volume. On the other hand, the degree of completeness of the fractional combustion over copper oxide does not appear to have been fully made out, though the method is one which has already been adopted to a large extent in gas analysis. In order to investigate the exactness of this method of fractional combustion, and thereby determine its applicability in gas analysis, trials were made of it by the authors on gaseous mixtures of known composition.

The method adopted consisted in the use of a tube of Jena glass bent into a spiral and having an internal diameter of 10 mm. (0·4 inch) and a length of 800 mm. (31·5 inches), packed with copper oxide which had been raised to incandescence. The spiral consisted of three turns about 70 mm. (2·8 inches) in height over all, and it was raised to the desired temperature by a hot bath of potassium and sodium nitrates. This arrangement answered quite well and ensured sufficiently long contact with a large area of copper oxide.

The gaseous mixtures of precise composition were freed from moisture by a calcium chloride tube followed by a tube of phosphorus pentoxide, and from carbonic acid by a potash absorption apparatus followed by calcium chloride and phosphorus pentoxide tubes. Air was used as a diluent of the different gaseous mixtures, as nitrogen from cylinders was found to be contaminated with small quantities of gases containing carbon.

CARBONIC OXIDE.

The oxidation of dry carbonic oxide with copper oxide begins at 145° C., and that of moist carbonic oxide below 100° C., but it is not complete at 310° C. Gases passed through at the latter temperature still showed carbonic oxide when tested with palladium chloride paper. Mixtures containing from 2·115 to 3·10 per cent. of dry carbonic oxide when passed through at rates ranging from 4·17 to 8·1 c.c. per minute at a temperature of 304° to 305° C. showed from 3·5 to 18·2 per cent. of the carbonic oxide unburnt. The extent of the incompleteness of the combustion appeared to depend not merely on the rate of flow but also on the degree of concentration of the gas. These results show that dry carbonic oxide when not mixed with other combustible gases is never completely burned at the usual temperature of fractional combustion. Even in the volumetric analysis of a mixture containing a large proportion of carbonic oxide, quite erroneous results may be obtained at the customary temperature; but, on the other hand, it has been proved that at a red heat combustion is complete. Combustion also is more nearly complete when the carbonic oxide is moist; but even in this case, it is not always complete.

HYDROGEN.

Hydrogen begins to burn at 160° to 170° C., and at 250° C. its combustion is complete. Tests were carried out at 300° C. on a mixture containing 1·96 per cent. of hydrogen, and no unburnt residue was found.

CARBONIC OXIDE AND HYDROGEN.

It is well known that hydrogen lowers the temperature of combustion of carbonic oxide and other gases, and thus carbonic oxide in the presence of small quantities of hydrogen is completely burned at lower temperatures. Experiments carried out at 300° C. on mixtures containing from 1·985 to 2·15 per cent. of carbonic oxide and 1·69 to 2 per cent. of hydrogen showed that both gases were completely burned, and that it would therefore

be possible to use the method for separating them quantitatively from methane.

ACETYLENE.

The acetylene used was produced from calcium carbide, and purified over acetylene-silver. The gas thus obtained was analyzed, and the proportion of pure acetylene found was taken for the subsequent calculations. Acetylene behaves quite differently from other gases on contact with copper oxide. Combustion begins at 130° C.; but carbon separates on the copper oxide, and is not burned. Thus a mixture containing 3·38 per cent. of acetylene, when passed through the apparatus at 300° C. at rates of 5·9 and 10 c.c. per minute, showed 8·3 and 5·3 per cent. of acetylene as unburned. If the acetylene is mixed with hydrogen the separation of carbon is reduced, but not prevented. Tests showed that admixture of hydrogen did not effect complete combustion of the acetylene at 300° C. Even the hydrogen itself is not completely burned in this case.

ETHYLENE.

A mixture containing 1·8 per cent. of ethylene, when passed through the copper oxide at 300° C., showed that 10·1 to 20·1 per cent. remained unburnt, owing to the separation of the carbon having occurred as with acetylene.

METHANE.

The combustion of methane over copper oxide begins at 310° C., but does not become complete until at red heat. With very small proportions of methane the combustion is not quite complete even at a red heat. Tests made with mixtures containing from 0·798 to 2·143 per cent. of methane, when passed through the copper oxide tube in a combustion furnace at a red heat, at rates of 7·2 to 8·17 c.c. per minute, showed that from 91·5 to 99·5 per cent. of the methane was burnt. The methane used was natural gas from Kissármás. Hydrogen exercises very little influence on the combustion of methane. The beginning of combustion is lowered by 3° or 4° C.; but combustion at a red heat does not become more nearly complete.

RESULTS OF THE INVESTIGATIONS.

The results of the investigations may be summarized as follows: At temperatures of 250° to 300° C. hydrogen is almost completely burned over copper oxide. Carbonic oxide by itself and in the dry state is only burned to the extent of 90 to 94 per cent. at 305° C. Mixtures of approximately equal quantities of hydrogen and carbonic oxide are completely burned at 300° C. Heavy hydrocarbons, like acetylene and ethylene, do not burn quantitatively at 300° C., even in the presence of hydrogen, owing to deposition of carbon.

As regards the completeness of combustion, benzene behaves like acetylene. The combustion of methane begins at 310° C., or, in the presence of hydrogen, at a few degrees lower. At a red heat methane burns completely when in high proportion in the mixture, but when in quite small proportion its combustion is incomplete. Hydrogen has no influence on its combustion at a red heat.

The points to be remembered in fractional combustion by this method are: (1) That mixtures of carbonic oxide and methane cannot be separated quantitatively; (2) that mixtures of approximately equal proportions of carbonic oxide and hydrogen, on the one hand, and methane, on the other hand, can be separated quantitatively by fractional combustion at 300° C.

In volumetric analyses it should be remembered that it has been shown, in working with the Drehschmidt-Ubbelohde apparatus, that errors may arise through evolution of oxygen by the dissociation of the copper oxide.

Comparing the results obtained with those of Haber and Weber's researches on the palladium asbestos method, it will be found that, for proportions of 1 to 3 per cent. of carbonic oxide and hydrogen, the two methods of gravimetric gas analysis have very nearly the same limits of error.

Calorific Standard for Kansas Gas.—As the result of steps taken by the Public Utilities Commission of Kansas to ascertain the value of the method of selling gas on the basis of its calorific power, all gas supplied to the consumers in the city will, for the future, be tested to determine the number of British thermal units it contains per cubic foot. Except by permission of the Commission, no natural gas is to be sent out having a heating power of less than 800 B.Th.U. The test is to be made semi-weekly, unless, in the opinion of the Commission, conditions warrant a different period.

Coal and Coke Production in the United States Last Year.—According to estimates received by the United States Geological Survey, the production of coal last year was 510 million short tons—a decrease of about 60 million tons compared with the record output of 1913. Practically all this reduction was in the bituminous mines. The principal portions were in the coking district; the yield in Pennsylvania alone dropping between 20 and 25 million tons. The reports of the coke production indicate that the output in the two Connellsville districts was less than that of 1913 by about 6 million tons, or 30 per cent.—representing a drop of nearly 10 million tons in the coal output in these districts alone. The proportionate decrease in the other coking districts was even greater.

DIRECT ADVERTISING IN THE GAS BUSINESS.

This was the subject of an address by Mr. A. R. FERNALD, of Detroit, at the annual meeting of the American Commercial Gas Association. In the course of it he made the following remarks.

The use of direct advertising after the salesman has gone is important. It visualizes and makes clear the very points the prospective customer may have missed in the salesman's solicitation, which means just this—that the salesman is only one-half equipped when he has not a book, a pamphlet, or an illustration to leave behind him. There are things that advertising will do that salesmen cannot do, and you should get it out of your heads once and for all that direct advertising is simply a means of inexpensively introducing your salesmen and your proposition. We know that it is good for that; but this represents only a part of its value. Another point to remember is that your direct advertising does not take the place of the active, closing salesman any more than that salesman can, under the same condition, take the place of the advertising. Both have their place in your sales plan, and are essential to its success.

Good judgment in planning a sales campaign comes from using the right weapon in the right place. The salesman need never be afraid of advertising as a competitor. That humbug has long since been laid aside. In covering the mission or function of direct advertising, I think we should consider, too, the fact that the first attitude of the public to any new thing is "No." And the fact that gas appliances are often new in principle to the customer strengthens this very point. People do not like to buy things they do not understand. We find people negative as a general rule—ready to say "No" at the slightest provocation because it is easier to say "No" than to take the trouble to figure the matter out. The biggest element in any sales barrier is ignorance. It is in breaking-down this barrier that direct advertising can best serve your purpose. The barrier is nothing more nor less than the high sounding "sales resistance" that our present-day business philosophers and psychologists play upon so mysteriously.

In the gas industry you have a large and unusual opportunity for direct advertising because you have positive and direct contact with your consumers at least twice a month—that is, when the meter is read and when the bill is delivered—as well as a possible contact at the time of payment, providing the bill is not paid by mail; and even then you have the opportunity of re-mailing the receipt. You have a chance at these times to put a well-worded message in the consumers' hands without paying extra for its delivery.

Another point that touches the very vitals of direct advertising is the fact that the most valuable asset a company can have in a direct advertising campaign is a well classified list. In a further consideration of this form of advertising as an aid to salesmen, I believe you show a lack of thoroughness in not consistently coaching your salesmen on your advertising. They should read it, study it, and understand it, because properly prepared direct advertising contains practically a skeletonized canvass; and to get the most from it, their arguments should be tuned to the same strength. The salesman's task is not an easy one, and it has been my experience that the average salesman needs help rather than prodding.

What we want to do is to make our salesmen "closers," not missionaries, for it is the sales that your salesmen miss that cost you money and bring up sales cost. In this connection, with both your advertising and your canvass, I cannot make it too strong that you should try to sell one thing at a time, not the line. There is nothing like concentration. Advertise one thing, solicit one thing, and clean-up your field and start on another. To talk about a variety of devices at one time only confuses your customer, and as a result you distract attention, and your salesmen do not get anywhere.

I believe that a strikingly neglected form of direct advertising is the letter. I do not believe that we have half enough letters in our contact with the trade. They furnish an excellent opportunity for the smaller gas company. Letters well written breathe personality, and are great moulders of public sentiment. They can be made of excellent use in following-up the sales devices in which there is apt to be some chance of misunderstanding in operation, or where the buyer may require some education in their use. Very often these instructions can be emphasized without fear of misunderstanding, and the users be given a clear record of just what they can expect the device to do under certain conditions.

I realize that with many of you advertising has not been considered a very serious part of your work. The proportion of undertakings that can employ an advertising manager who devotes his entire time to the work is small; and, of necessity, the advertising of most of you represents only a part of the activity of a single man. In these cases, I think you should be less afraid of advertising.

Advertising is not so much a matter of eloquence as of simplicity. Tell your story simply as you would tell it to a friend. The first thing you know you will be writing some pretty good advertising. When you go home from this meeting resolve that you will regard your advertising neither in the light of a necessary evil nor a big "something" so complicated that it has you bluffed. Think of it as your big asset, a big business force—

yours to use at will. Resolve to analyze conditions both in the sale of devices and in the extension of service in present territory; and to meet these conditions by being forearmed with a real sales and advertising plan. Resolve that when you have a thing to sell, and are going to send out salesmen on it, you will plan direct advertising that hooks-up closely with your salesmen's solicitations. Resolve to pay more attention to the possibilities of well-written letters; also to use some of the good advertising the manufacturers have prepared for you, and to use it just as efficiently as you know how. Do not use it just because it is free —not expecting results, and consequently not getting them.

COLLECTION OF CRUDE TAR IN FRACTIONS.

This was the subject of a paper read at the meeting of the Scottish Section of the Society of Chemical Industry in Glasgow last Tuesday by Mr. G. T. PURVES, Assoc.M.Inst.C.E., of the Auchengeich Coke-Ovens, Chryston. The author is a member of the Western District Section of the Scottish Junior Gas Association; and it may be recollected that he contributed a paper "On the Application of Coke-Oven Carbonizing and Otto Direct Ammonia Recovery to Gas-Works Requirements" at the last meeting of the Institution of Gas Engineers. We are indebted for the following abstract of the paper to the "Chemical Trade Journal."

Mr. Purves said the complete collection of crude tar in fractions had not hitherto received the attention which its importance justifies. Apart from the purely commercial aspect, it is worth considering how far the primary separation of the crude tar into the usual first fraction in the closed condensing system would be helpful to the reduction of atmospheric pollution. In some tar-works the gases evolved from the tar are burnt direct, and in others passed through purifiers. In the case of direct fractionation, this gas would go to augment the volume of permanent gas produced.

In the Young and Aitken process, the central feature was the analyzer in which fractional condensation was carried out. No effort was made, however, to collect separately the tar fractions deposited in the different sections of the analyzer. The tar was allowed to flow downwards from section to section, so permitting the gas to take up as much as possible of the lighter constituents of the tar—this being the principal intent in the process. Fractional condensation with a counter-current flow of condensed products thus took the place of sending the gas and condensed products in the same direction.

In many of the special methods applied for the extraction of tar, fractional separation has been an underlying factor. The stipulation that the tar should have contact with the gas only at such a temperature as would ensure its not dissolving the light oils, as laid down by Mr. Young in 1876, is fulfilled in direct tar fractionation. Mr. Young abandoned the principle of the Young and Aitken process on account of the trouble with the condensers due to the greater amount of naphthalene produced in later carbonizing practice; but an extended application of this principle, using naphthalene-free anthracene oil, would entirely overcome the difficulty.

The author said he regarded the method advocated by Mr. William Young so many years ago as still the correct one for gas-works condensation practice, and particularly so with carbonization in continuous vertical retorts, In a number of works using these retorts, a surprisingly low candle power of the gas has been found, on account of the light tar fog persisting with the gas till almost the final stages of cooling, and so removing from it illuminating hydrocarbons.

The American Gas Institute and the No. 2 Burner.

Following upon the reading of a paper by Mr. F. H. Gilpin, on "Efficiency Relations Existing between Various Argand and Open-Flame Test-Burners," in the Manufacturing Section of the American Gas Institute, at the last annual meeting, it was unanimously decided to recommend to the Institute the adoption of the "Metropolitan" No. 2 burner as the standard for testing the illuminating power of gas—its advantages having been clearly shown by the author. The recommendation came before the Institute on the last day of the meeting; but, in view of the fact that the action proposed was an important one, and that members who were not present at the meeting should be afforded an opportunity of submitting any objection they might have to the step, it was referred to the Board of Directors, with full power to act. At their meeting on the 10th of December, the Board decided that this statement should be inserted in the "Gas Institute News;" and it accordingly appears in the January issue. The question will come before the Board at their meeting next Monday.

The ordinary meeting of the Society of Engineers was held last night at the Institution of Electrical Engineers, Victoria Embankment, when Mr. H. C. H. Shenton (the President last year) presented the premiums awarded for papers published in the Society's "Journal" during 1914. Mr. Norman Scorgie, the President this year, subsequently delivered his inaugural address.

NEW BASIS OF CHARGING FOR GAS.

At a Meeting of the Empire State Gas and Electrical Association, Mr. H. L. COLEMAN brought under the notice of the members a system of charging for gas based upon use, and not upon the quantity used.

The author said that long ago it became apparent to his Company that, to obtain the maximum sales of gas in the communities served, it would be necessary to adopt a schedule of rates which would place gas in the strongest competitive position with other sources of light, heat, and power. It had been their endeavour to make the price so low that no householder could afford to use any other fuel for cooking, heating water, burning his garbage, &c. They wanted to be ready to sell gas at a rate that would get and hold the business at a profit for more than a thousand uses.

Much of the Company's gas sold at the straight-line rate of $1 per 1000 cubic feet was an actual loss to them. They found that at least one-third of their consumers in one community were not paying the cost of service to them; while they were just about "breaking" even on many more. Obviously, the few large consumers were bearing the losses occasioned by the number of small ones; and while some of the larger consumers were anxious to burn more gas if the Company would quote them an attractive competitive rate, this they could not afford to do, owing to the number of unprofitable consumers already on the books.

As a step towards the solution of the problem, they decided to put in force a schedule of rates based on the division of their annual expenses into two classes of costs—viz., those bearing relation to the number of consumers or meters, called "consumers' expenses;" and those varying with the number of cubic feet of gas used, or "output expenses." Competent engineers were employed to analyze the Company's costs, and arrive at a fair figure for consumers' expenses; and the result showed an annual outlay of $6·04 per consumer.

The Company then put in force the following rate: 50 c. per month per meter consumer's charge, *plus* 80 c. per 1000 cubic feet for all gas consumed; 50 c. minimum charge where no gas is used. "This," said the author, "makes a simple rate to explain, is a substantial reduction to the large consumer, an incentive to the small one to increase his consumption (due to the fact that it makes gas the cheapest fuel he could possibly use), and it is not an excessive burden on the consumer who has no additional use for gas—such as small offices and the like—for in no case does it raise anyone's bill more than 40 c. a month, as we already had a 50 c. minimum under our straight-line $1 rate. It also answers the politicians' demand that everyone shall be treated alike, as all pay the 50 c. consumer's charge and all pay 80 c. for gas." Mr. Coleman thought the rate would have a great tendency to reduce the price of gas still further, as it opened the field of maximum sales and maximum net earnings to the interest of the community at large, by bringing about a constantly lowering price; and future large consumption would benefit the Company and the smallest consumer.

The author summed up the working of the foregoing system of rates as follows: (1) That straight-line rates are economically wrong; (2) maximum sales depend on the competitive position of gas; (3) unprofitable consumers are made to pay at least what it costs to serve them; (4) The profitable consumer is relieved of the burden of the unprofitable one; (5) reductions in rate are based on total net revenue, instead of the haphazard methods previously employed; (6) lower rates are made possible, benefiting the whole community; (7) new business is acquired more easily and at less cost; (8) a better standing before the Public Service Commission, as the rate is on a scientific basis; and (9) better relations with the public.

In the second portion of his paper the author advocated the charging of special purposes. He submitted that the fundamental principle for rate-making should be that rates must be low enough for each class of business, considering competition, or what a particular class of business could afford to pay. A schedule of rates which would not get the business, however scientifically made, was obviously useless. There was a large amount of business that could be obtained by gas companies which could only be secured by making special rates for special uses.

AMERICAN GAS INSTITUTE AND REFRACTORY MATERIALS.

The Refractory Materials Committees of the American Gas Institute and the Refractories Manufacturers' Association held a joint meeting in Rochester (N.Y.) towards the close of last year; and we learn from the "Gas Institute News" that practically the entire time was given over to a revision of the proposed standard specifications covering fire-clay and silica refractory materials for use in gas-works. Each point was taken up separately and was thoroughly discussed. This was the third meeting at which these specifications have been discussed in detail; and it showed that there is still considerable difference of opinion among members of the Committees. These differences resulted principally from lack of real knowledge of the subject; and the Committee decided, before coming to a final decision on the various points involved,

to have a series of tests made under the direction of Mr. Bleininger, of the Washington Bureau of Standards, at the Testing Laboratory in Pittsburgh.

The tests which are to be conducted and the method of procedure are as follows: The manufactures represented by members of the Refractories Manufacturers' Association Committee will send to Pittsburgh various samples of fire-clay and silica bricks. The bricks will be piled in the form of a pier, and tested for refractoriness with loads varying from zero to 40 lbs. per square inch in a manner prescribed and directed by Mr. Bleininger. The behaviour of the column under the methods of test, as regards softening and expansion and contraction, both temporary and permanent, will be noted. At the same time tests will be made with single bricks under corresponding methods of procedure; the idea being to compare the effects of the test on the pier and the single brick, and to notice the difference in their behaviour. The members of the Committee felt that the pier test would be a closer approximation to the actual working conditions, and that, before fixing clauses in the specifications based upon the single-brick test, it was important to know the exact relationship between the effects produced upon the pier and upon the single brick as tested for refractory qualities under load.

ANALYSIS OF COAL WITH PHENOL AS SOLVENT

By S. W. Parr and H. F. Hadley.

The purpose of the investigation was to examine and enlarge upon certain processes of analysis which proceed in such a manner as to separate in unaltered form the fundamental substances of which coal is composed, and to study their characteristic properties in detail. Much suggestive information has come from the study of the types of vegetable matter which constituted the source of the initial coal substance. A line of evidence developed by numerous investigators who have made use of various solvents, differentiated the original organic constituents into two general classes—those of the cellulose and those of the resinic type. The present investigation, as described in Bulletin No. 76 of the Illinois University Experiment Station, proceeded on the general hypothesis that in coal two types of compounds are met with—(1) the degradation products of the original cellulose substances, and (2) the less altered, and perhaps more characteristic, compounds of the resinic type.

After numerous trials, phenol was chosen as being a true solvent, in that it does not develop chemical changes either in its own structure or that of the components of the coal. While the use of pyridine has been general, it is considered that the increase in the amount of nitrogen which is found in both the extract and residue after treatment with pyridine must be taken as an index of the formation of substitution products not originally present in the coal substance. Five grammes of the coal were continually extracted at 110° C. for the space of twenty hours, in presence of carbon dioxide; this being sufficient to take out the whole of the soluble material.

The application of the method to different types of coal showed that coal varies widely in the amount of material dissolved by phenol. The amount of soluble matter seems to differentiate sharply between subdivisions of coal types. On the ash and moisture free bases, the high volatile coals of Vermilion County gave 35 to 40 per cent. of soluble material, and the low volatile coals of Williamson County show 20 to 30 per cent. of matter soluble in phenol.

After extraction, the coal leaves a residue that will not coke; the coking constituent being in the extract. The residue and extract oxidize at room temperatures, and more readily at 100° C.; the rate of oxidation being more rapid in the residue. Residue and extract possess an avidity for water as well as oxygen at ordinary temperatures; the residue again showing the greater avidity. The extract contains more volatile matter than the residue; while the ultimate analysis of the coal, residue, and extract shows that the percentage composition of carbon, hydrogen, nitrogen, and oxygen is substantially the same. Destructive distillation of coal residue and extract, gave gases of practically the same composition, as shown by the following figures:

Composition of Gas.	Coal.	Residue.	Extract.
Carbon dioxide	18·1	15·1	12·9
Ethylene	3·4	3·5	3·1
Oxygen	0·5	0·9	0·1
Carbon monoxide	20·6	17·4	16·4
Hydrogen	35·6	39·2	47·8
Methane	17·4	18·1	13·4
Ethane	1·6	1·5	2·8
Nitrogen	2·8	4·3	3·5

Oxidation of coal, residue, and extract produces a lowering in the percentage of volatile matter. Oxidation decreases the amount of material which may be extracted from coal by phenol, and the coking properties are decreased in proportion to the extent of the oxidation. Oxidation of coal, residue, and extract is shown by an increase in the percentage of carbon dioxide in the gases produced by thermal decomposition. It is concluded, therefore, that the oxygen absorbed is chemically held.

LOW-TEMPERATURE DISTILLATION.

Dr. F. M. Perkin's Cantor Lectures.

In his second Cantor Lecture, on "Oils, their Production and Manufacture," before the Royal Society of Arts on Monday of last week, Dr. F. Mollwo Perkin referred to the hopes which have been expressed from time to time, of obtaining large quantities of motor spirit from coal by low-temperature distillation.

Those who had designed retorts for this purpose, he said, had been extravagant in their anticipations; and there had been too much loose talk of phenomenal yields of motor spirit. The fact was that methods of distillation had not been sufficiently studied, with the result that crude products had been spoken of as if they were purified products. Coal owners and others who had subjected their minerals to distillation in various retorts had consequently been considerably disappointed. Personally, he believed there was a very great future before low-temperature distillation; but care should be taken not to exaggerate. There had been too many "wild-cat" schemes, and the formation of syndicates with the object of getting money without first having worked out the system. Some who had had to do with the flotation of these schemes had, he was afraid, been a little careless in their statements. Many of the enormous claims made out for the production of motor spirit in this way could, on examination, be reduced to one-third.

The best-known processes for producing motor spirit of this kind were the Coalite, the Del Monte, and the Tarless Syndicate—one of the objects being the production of a smokeless fuel. There was not always a good market for this kind of fuel; but there was an increasing market for the other products of the processes—viz., various oils and sulphate of ammonia.

One drawback of the Del Monte process originally was that the retort quickly became blocked-up if a caking coal was used. He understood, however, that a form of retort had now been designed in which any kind of coal could be used. Results with a Scottish cannel coal, which contained some 31 per cent. of volatile matter, showed a yield of 37 gallons of crude oil per ton—the smokeless fuel remaining behind containing 9 per cent. of volatile matter. The crude oil on fractionation gave 1 gallon of motor spirit, 3 gallons of fuel oil, 16·9 gallons of heavy oil, 3 lbs. of wax, and 124 lbs. of pitch. This showed how purification reduced the quantity of oil available for motor purposes.

The Tarless Syndicate's process worked on a totally different principle, and produced a good smokeless fuel. Caking coals could be used very readily. With this process, a Yorkshire coal containing 29½ per cent. of volatile matter gave 18 gallons of crude oil per ton, which, on purification, yielded 3 gallons of motor spirit, 2¼ gallons of intermediate oil, 8½ gallons of fuel oil, 8 lbs. of paraffin wax, 50 lbs. of pitch, and 22 lbs. of sulphate of ammonia. It was possible with the smokeless fuel from this process to light a fire without any ordinary coal, which was not the case with all smokeless fuels.

High-Pressure Gas Lighting at the Panama-Pacific Exhibition.—The grounds and buildings of this exhibition are entirely piped for gas. The street main system in the grounds consists of steel high-pressure mains with welded joints and laid in loops entirely to avoid dead-ends. The mains are supplied with gas at a maximum pressure of 30 lbs., and the pressure is reduced by governors to any pressure desired within the palaces and other buildings. Gas street lighting will be an attractive and important feature. The whole of the Marina and the Esplanade and the portions of the grounds occupied by State and Foreign pavilions will be lighted by 300 high-pressure gas arcs on ornamental posts; the entire height of each, including the lamp, being 18 ft. 6 in. These are surmounted by opal globes 21 inches diameter horizontally, and 30 inches diameter perpendicularly. The mantles will be supplied with gas at a pressure slightly less than 3 lbs.; and the lamps will each develop an illuminating power of 1100 candles.

Portland Cement Concrete.—The "Proceedings of the American Society for Testing Materials" for the past year contains [p. 14] a paper presented by Mr. A. Moyer on "Proportioning Aggregates for Portland Cement Concrete." The "Journal of the Society of Chemical Industry" recently contained an abstract of the paper; and according to this the ingredients are mixed in proportion to give maximum density, which the author considers necessary for securing the greatest strength in the concrete. Thus sand and cement mortar is made so that the voids in the sand (determined directly by mixing sand and water in known volumes) are completely filled with cement paste, every cubic foot of which requires 110 lbs. of cement; and when stones of two sizes are used for the coarser aggregate, they are mixed in such proportion that a minimum volume is produced for a definite combined volume before mixing. A table is given showing the percentage of voids in crushed stone (from material of nine specific gravities, from 2·70 to 3·25) for a series of weights per cubic foot ranging, in each case, from 80 lbs. to 124 lbs., and another showing the proportions of stone and mortar, for eleven different sand to cement ratios, necessary to give the densest concrete, when the coarse aggregate contains 27 to 54 per cent. of voids.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Coke Fuel.

SIR,—The interesting lecture on the above subject, by Professor Vivian B. Lewes, printed in your last issue, indicates a practicable means of making gas coke more suitable for domestic use.

In the matter of fuel supply, most gas undertakings are concerned in catering primarily for the domestic consumer; and, while it is recognized that this market for gas coke will always be the most attractive, this class of consumer will always be hypercritical—the standard of demand being based on the custom of burning coal having a comparatively low ash content, and flaming freely during combustion.

To increase the average proportion of volatile combustible matter to 4 or 5 per cent., as suggested by Professor Lewes, would undoubtedly very materially improve the attractiveness of gas coke as a fuel for open grates. Without, however, a corresponding decrease in the proportion of ash (the objectionable presence of which is as much the cause of its sullen behaviour as is the lack of volatile matter), it is doubtful whether any commercial advantage gained by following Professor Lewes's suggestion would not be seriously discounted by loss of business in other directions.

Although in many districts the domestic is the principal market, it is by no means the only one in any district; and to radically alter the well-known characteristics of gas coke in the manner suggested is likely to seriously impair its usefulness and efficiency as fuel for other purposes than that of direct heating in open grates. For instance, from the point of view of the baker and the horticulturist (both considerable users of coke), who often prefer anthracite by reason of its slower burning qualities, the present proportion of volatile matter is enough; while for the glass-blower it is already much too great.

To these consumers, and to users of closed stoves, and other apparatus primarily designed to burn coke, the suggested change might not, therefore, be in the nature of an improvement. From a close study of current normal rates (a tabulated list was published in your issue for Nov. 24 last), it will be observed that steam-users pay a price for natural steam-raising fuel which is roughly in inverse proportion to the volatile and ash content, as it is these factors which, to them, determine the efficiency, and, what is equally important, also largely determine the rate at which the fuel can be burnt per foot of grate area.

For this purpose most of the gas coke produced nowadays—however carefully graded—would be improved if it had a greater proportion of volatile combustible matter; but its efficiency might be impaired if this were increased to the extent suggested. Compared with gas coke, the highest-priced solid commercial fuel, anthracite, differs in chemical composition only in the matter of ash content; and as to physical properties the latter is at considerable disadvantage, when used for steam-raising, owing to its extreme density, and consequent low rate of combustion. In coke-oven practice, where the coal is washed previous to being carbonized, the degree of purity attained is relatively high; and the price realized for steam-raising purposes is fully equal to that of good quality soft Welsh coal.

There can be no doubt whatever that a higher standard of purity in gas coke is at least as desirable for all fuel purposes as is a greater proportion of volatile matter for purely domestic purposes. The cost of washing coal for coke-oven carbonization—which eliminates sulphur as well as non-combustible matter—is said to be about 2½d. per ton.

E. W. L. NICOL, Engineer,
London Coke Committee.

39, *Victoria Street, S.W., Jan.* 28, 1915.

The Relationship between the Cost of Coal and the Price Realized per Ton of Coke.

SIR,—Hitherto there has been almost a direct relationship between the cost of coal per ton at the works and the amouut realized per ton for coke; and, with comparatively slight variations, the cost per ton for coal at the works is realized for a ton of coke at the works. From this, we have a right to assume that the factors which go to influence the cost of coal influence also in a similar degree the value of coke.

In my own experience I have applied the principle that when a concern (wherever situated) does not, on the average, realize for its coke per ton the same figure as is paid per ton for coal, it is disposing of its coke at less than need be done.

On the contrary, there are many instances where better prices are obtained, owing to favourable local circumstances. At the present time, with the cost of seaborne coal such a terrifying factor to many concerns, it is as well to bear in mind that the same influences which make coal dear should enhance the value of gas-works coke, and justify its price being advanced proportionately.

To prove the close relationship between these two factors, I have taken the figures of an important company (whose internal economy is not affected by water-gas manufacture or blue-gas admixture) and have traversed a great many years in order to bring up the facts. The following table illustrates the point I have raised, and seems to prove my contention from several points of view:—

TABLE *Illustrating the Relationship between the Cost of Coal and the Price Realized per Ton of Coke.*

Year.	Cost of Coal per Ton in Works.	Amount Realized per Ton for Coke at Works.	Amount Realized per Ton of Coal for Coke.	Percentage of Amount Realized for Coke on Cost of Coal.	Amount Realized for all Residuals per Ton of Coal.	Percentage of Amount Realized for all Residuals on Cost of Coal.
	s. d.	s. d.	s. d.		s d.	
1899 .	11 11·28	13 2·14	6 8 41	56	8 11·17	75
1900 .	17 6·55	17 2·24	8 7·96	49	11 3·55	64
1901 .	15 0·21	15 9·81	7 4·76	49	9 6·18	63
1902 .	12 4 16	12 6·15	5 11·15	48	8 4·73	68
1903 .	11 10·00	13 4·72	6 3·43	53	9 4·91	79
1904 .	11 2·29	12 3·40	5 10·87	53	9 1·48	81·5
1905 .	10 11·29	10 4·15	4 11·71	45	8 1·62	74
1906 .	11 6·43	10 11·59	5 3·59	46	8 3·05	71·5
1907 .	13 5·00	13 5·96	6 2·45	46	9 4·89	70
1908 .	13 9·37	13 5·41	6 4·03	46	9 6·24	69
1909 .	12 4·41	11 2·09	5 4·09	43	8 5·61	68
1910 .	12 0·39	12 0·36	5 8·43	47	9 1·34	76
1911 .	11 11·36	13 3·31	6 5·75	54	10 4·01	86
1912 .	14 7·14	14 4·86	6 10·12	47	11 2·77	77
1913 .	16 1·96	15 1·70	7 3·94	45	11 10·31	73
Average for Fifteen Years.						
—	13 1·32	13 2·92	6 4·31	48·5	9 6·39	73
Average of Each Completed Quinquennial Period.						
1899-03	13 8·84	14 5·01	6 11·94	51	9 6·11	69
1904-08	12 2·08	12 1·30	5 8·93	47	8 10·66	73
1909-13	13 5·05	13 2·46	6 4·07	47	10 2·41	76

The last column illustrates the effect of the increased cost of raw materials upon the industry; and notwithstanding the extreme fluctuation in the cost of coal, the value of products is shown on the average to move in sympathy.

I have carefully avoided dealing with the question on the basis of per 1000 cubic feet, for the reason that the raw material purchased is in tons represented by money, and the only way of drawing a proper conclusion is to treat the products on the same basis.

A further analysis [see table at foot of page] dealing with consecutive quinquennial periods from 1899 reveals a similar sympathy between the two, and shows that up to the present the gas industry has succeeded in winning-through by a payment out of pocket of 3d. for each 1s. rise in the cost of coal. Let us hope 1915 may be no exception!

W. R. HERRING.

Palace Chambers, Westminster, S.W., Jan. 28, 1915.

Weighing Attachments on Retort-Charging Machines.

SIR,—My attention has recently been called to the editorial comment in your issue of Nov. 17, referring to the automatic weighing of coal-charges to retorts and fuel charges to producers—described in the Carbonization Committee's report of the American Gas Institute; also to the correspondence, resulting from the editorial, in your issues of Dec. 1, 8, and 15.

It appears that your correspondent in the Dec. 1 issue has missed the point entirely, as weighing apparatus of the type he describes is generally known to be old in the art. A machine of this sort—manufactured by West—was installed by us at the Worcester (Mass.) plant as far back as 1904. A careful reading of the paragraph at the top of the second column on p. 368 of your issue of Nov. 17 will give your correspondents an accurate idea of the present developments, in which weight records are automatically produced without even so much as the necessity of the operator's knowledge that the weighing and recording operation is going on.

H. A. CARPENTER, Vice-President,
Riter-Conley Manufacturing Company.

Pittsburgh, U.S.A., Jan. 15, 1915.

Coal Contracts.

SIR,—It may be assumed that all gas undertakings are finding their contract supplies of coal are being cut down. To justify this action, coal owners fall back upon the "suspension of contract" clause, of which the following may be taken as a fair sample:

> "In the case of strikes, lock-outs, combination, or restrictions by workmen, or disputes with workmen, stoppage of works from accident, short supplies of waggons, or other unavoidable circumstances affecting the working of the colliery, the sellers shall not

TABLE *Illustrating the Relationship between the Cost of Coal and the Price Realized per Ton for Coke.*

[Average for Each Consecutive Quinquennial Period.]

—	1914 to 1910.	1913 to 1909.	1912 to 1908.	1911 to 1907.	1910 to 1906.	1909 to 1905.	1908 to 1904.	1907 to 1903.	1906 to 1902.	1905 to 1901.	1904 to 1900.	1903 to 1899.
Price of coal		13/5·05	12/11·33	12/8·51	12/7·52	12/4·90	12/2·08	11/9·40	11/6·83	12/3·19	13/7·04	13/8·84
Price of coke		13/2·46	12/10·41	12/8·23	12/2·68	11/10·64	12/1·30	12/1·16	11/10·80	12/10·45	14/2·86	14/5 01
Total of residuals . .		10/2·41	9/8·79	9/4·42	8/11·43	8/9·08	8/10·66	8/10·39	8/7·96	8/10·98	9/6·57	9/6·11
Percentage of residuals of price of coal. . .		76·1	75·2	73·7	70·9	70·6	73·0	75·2	74·9	72·7	70·3	69·2

be bound to deliver while the same lasts, and the quantity which would otherwise have been delivered shall be excluded from this contract."

It will be seen that there is no specific reference to any difficulty which may be caused by the country being at war. But it is contended by the coal owner—first, that there is a shortage of waggons; and, secondly, that owing to the number of men who have joined the Colours the "unavoidable circumstances" mentioned have arisen, affecting the working of the collieries, inasmuch as the quantity of coal which is being raised has been materially diminished. I venture to submit, however, that these protective clauses cannot legally be taken advantage of, so long as the colliery companies are supplying outsiders with coal, which they are now doing at greatly increased prices. I submit that their contract buyers have the first claim to the coal raised.

It is obvious that it cannot be contended that the owners are unable to fulfil their contracts while they are selling coal to "outside" people, to whom they are not obliged to sell. In other words, I contend that they are not carrying out their contracts so far as they have means to do so. And I would further submit that, until they have done this, it is not open to them to raise the difficulty about either the shortage of waggons or the diminished output of coal.

Really the coal-owners' contention amounts to this—that the existing circumstances automatically bring the "suspension of contract" clause into operation. My reply is that these circumstances must be of such a nature as to prevent the selling contractor carrying out his contract or any part of it; and certainly these circumstances have not as yet arisen.

The question is one of great and urgent importance, and calls for serious consideration.

Jan. 28, 1915. COAL BUYER.

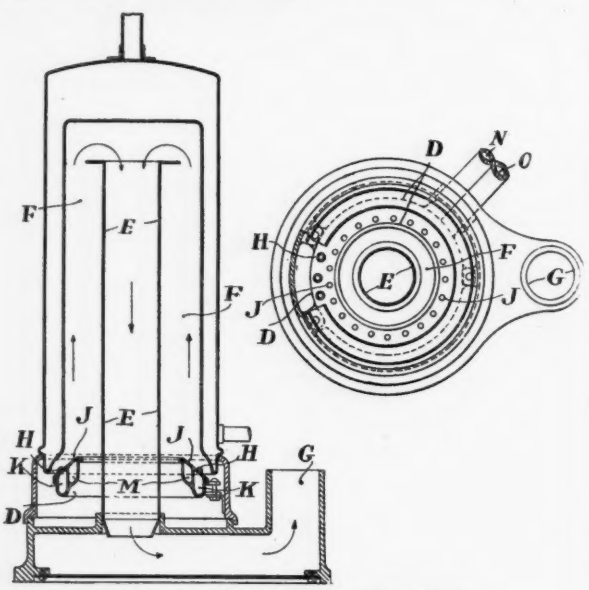
REGISTER OF PATENTS.

Water-Heaters or Circulating Boilers.

FLETCHER, RUSSELL, AND CO., LIMITED, and FLETCHER, T. W., of Warrington.

No. 706; Jan. 10, 1914.

This gas water-heater is so arranged that the hot gases from the burner pass through the flue and then through the annular space between the flue and the inner shell of the boiler into the base, whence they find a suitable outlet at the base.



Fletcher, Russell, and Co.'s Gas Water-Heaters.

A hollow base is provided which supports a ring whereon rests an annular boiler closed at the top. In the ring is arranged an annnlar gas-burner D and in the boiler is a flue E, which (passing through the burner and being supported by the base) communicates with the interior. By this means the hot gases from the burner pass directly into the annular space F between the inner shell of the boiler and the flue, and "come into contact with the shell of the boiler when they are hottest." From the space F the gases pass through the flue into the interior of the base, whence they are led off by the outlet G.

The burner preferably has two rings of nozzles or jets H J, having separate mixture chambers K M supplied by separate pipes N O, so that either or both rings may be used as desired.

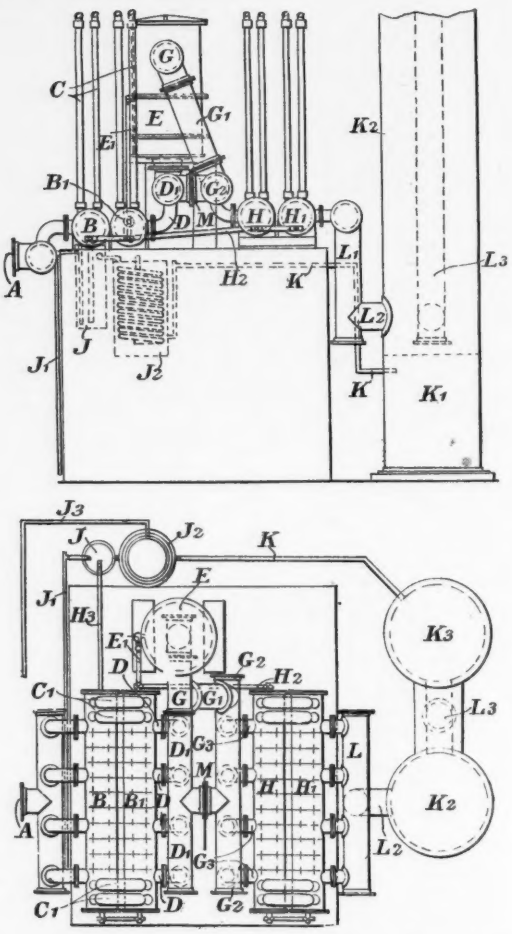
Treating and Recovering Tar and Ammoniacal Liquor from Producer or Other Gas.

MOORE, Q., of Riddrie, near Glasgow, and the DOWSON AND MASON GAS-PLANT COMPANY, LIMITED, of Levenshulme, Manchester.

No. 2650; Feb. 2, 1914.

The invention is intended to provide plant "for the treatment and recovery of tar and ammonia liquor from producer or other gas, and is such that uniform and dehydrated tar and highly concentrated ammonia liquor are obtained."

Typical apparatus for carrying out the process is diagrammatically illustrated in elevation and plan.



Moore's (Dowson and Mason Co.) Tar and Ammonia Recovery Plant.

The gas from the retorts or producer enters by a connection A and passes to an air-cooled condenser, wherein its temperature is reduced "to that satisfactory for the extraction of its tar." This condenser consists of two chests B B^1 connected by vertical pipes C and headers C^1. From the second chest the gases pass by pipes D to a horizontal main D^1 opening at one end into the lower end of a tar-extractor E (of any convenient form) arranged at such a level that the tar and water of condensation flow back to the chest B^1 by a pipe connection E^1.

The gas, after leaving E, is led by pipes G G^1 to a second horizontal main G^2, from which it passes by further pipes G^3 to the first chest of a second atmospheric condenser H H^1, similar in construction to the first condenser. The tar and water of condensation from this second condenser pass back by a pipe H^2, connecting the first chest of the second condenser with the pipe connection E^1 leading from the tar-extractor to the second chest B^1 of the first condenser. The tar and condensed steam flow back through the two chests of the first condenser in a direction contrary to the flow of the gases, and the tar therefore comes into contact with the hot gases, and is so thoroughly heated that dehydration takes place; while the light and heavy tars are thoroughly mixed and "tar of uniform consistency" obtained.

The tar and water of condensation from the gases pass from the first chest of the first condenser by a pipe H^3 into a separator J (of any suitable construction), and are there automatically separated by decantation. The tar passes from this separator by a pipe J^1 to a tar well or storage tank.

The virgin liquor (the water of condensation from the gases) overflows from the separator J into a heat exchanger J^2—a tank in which is a coil of piping through which water is passed. The virgin liquor gives up its heat to the water, which may be used as the supply for the water-jacket surrounding the producer—the water passing from the heat exchanger by a pipe J^3 to the water-jacket. Thus the production of steam in the jacket is facilitated.

The now cooled virgin liquor is led from the heat exchanger J^2 by a pipe connection K to a sump K^1 beneath gas scrubbers or towers K^2 K^3, to which the gas from a final horizontal main L, connected with the second chest H^1 of the second atmospheric condenser, is also led by pipe connections L^1 L^2. The scrubbers are connected by intermediate pipe connections L^3, and the liquor is pumped as usual from the sump K^1 to the top of the scrubbers; so that the liquor and gases pass through the towers in opposite directions. "The ammonia is therefore thoroughly washed from the gas by this liquor; and as the latter is thoroughly cooled before it enters the washing towers, a strong ammonia liquor solution is thereby obtained."

A valve connection M is made between the horizontal mains D^1 G^2, and similar valve connections [not shown] are made between the main D^1 and the tar-extractor E, also between the pipe connections G G^1

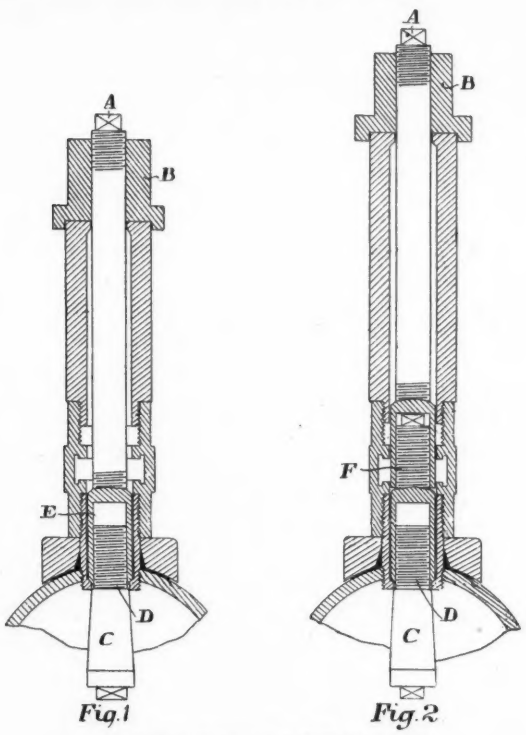
leading from the extractor to the horizontal main G^2. Normally the valve connection M is closed and the other valves referred to open; but in the event of it being necessary to shut-off the tar-extractor for examination or repair, the valve M is opened and the others shut. When this is the case, the tar-extractor is cut out; and the gas passes direct from the first condenser to the second.

Securing Service-Pipes to Gas and Water Mains.

PARKINSON, B. R., of Woodside Park, N.

No. 9653; April 18, 1914.

The inventor mentions that in patent No. 23,414 of 1907 there was described a construction of nipple, and also certain tools by which the nipple could be expanded. In patent No. 19,628 of 1908 means were described by which the expansion of the nipple could be effected while a main was under pressure—comprising a valved junction piece or a plug or other cock, a mandrel adapted to be withdrawn through the junction piece or cock, a sleeve screwed into the junction piece or cock, and a nut bearing against the outer face of the sleeve and engaging with screw threads on the upper part of the mandrel. The mandrel was made in two sections—a lower tapered section which was formed with an upper screwed stem, and secured in position by a small nut engaging with the stem and bearing against the upper end of the nipple, and an upper section provided at its lower end with a screwed socket which engaged with the screwed stem of the lower mandrel section. When a plug cock is employed, the bore of the cock through which the mandrel was withdrawn had to be of a diameter somewhat greater than the external diameter of the small nut; and from this point of view the nut was a disadvantage. The present invention has been devised with the object of dispensing with the nut (and thus enabling a cock or valve of less bore to be employed) by using a mandrel of such construction that the securing of it to the nipple can be effected at the beaded or thickened part of the nipple.



Parkinson's Service and Main Connector.

Two different constructions of mandrel and parts co-operating with them, are shown. In both figures the nipples are shown formed at their front ends with an internal beading or thickened part and on their exteriors with two sets of screw threads. The mains are formed with holes tapped with threads corresponding with the screw threads of the nipples, and the bodies of the valves are provided at their front ends with screw threads corresponding with the threads of the nipples, and at their outer ends with screw threads. Sleeves, formed at their front ends with screwed extensions, engage with the screw threads of the valve bodies. A are mandrels constructed according to the present invention; and B are nuts bearing against the outer ends of the sleeves and engaging with screw threads formed on the mandrels. With the exception of the particular construction of the mandrels all the above enumerated parts form no part of the present invention.

Referring first to fig. 1, a mandrel A fulfilling the purpose of the invention may be formed in two parts, corresponding with the similar parts of the mandrel described in the 1908 patent—namely, a lower section consisting of a tapered part C and a screwed stem D, and an upper section consisting of a socket E, snugly fitting the full bore of the nipple and provided in its interior with screw threads engaging with the stem D, and of a screwed rod adapted to engage with the nut B. As shown, the upper end of the tapered part of the lower section of the mandrel would bear against the front part of the beaded or thickened portion of the nipple and be drawn against same by the upper mandrel section, which would bear with its lower end against the rear part of the beaded or thickened portion of the nipple.

Again, as shown in fig. 2, the mandrel may be constructed in three sections—a lower section, consisting, like the lower section of the mandrel illustrated in fig. 1, of a tapered part C and a screwed stem D; a second section formed at its rear end with a screwed stem F and at its front end with a screwed socket adapted to engage with the screwed stem of the lower section, and made of such external diameter as to somewhat snugly fit the full bore of the nipple; and a third section consisting of a screwed rod adapted to engage with the nut B, and provided at its front end with a screwed socket adapted to engage with the screwed stem of the second section of the mandrel. As in fig. 1, the upper end of the tapered part C of the first or lowermost section of the mandrel would bear against the front portion of the beaded or thickened part of the nipple, but in this case it would be drawn against it by the second section of the mandrel, which would bear with its lower end against the rear portion of the thickened part of the nipple.

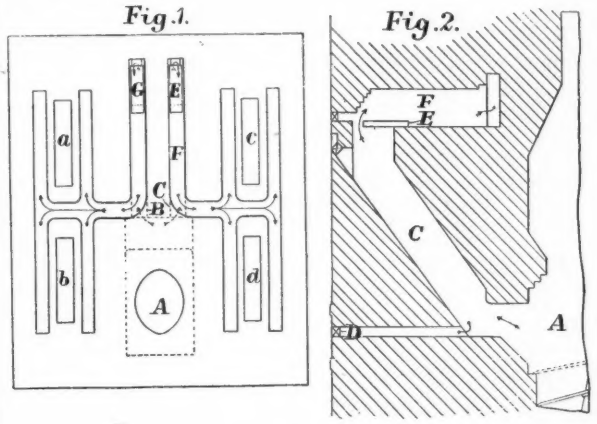
Gas-Retorts.

TOOGOOD, H. J., and ROBERT DEMPSTER AND SONS, LIMITED, of Elland.

No. 9923; April 22, 1914.

In order to economize labour and fuel in gas-works, the patentees remark, a number of gas-retorts are usually grouped with each producer; and to obtain the advantages of large units in smaller works, it has been proposed to divide the retorts of one setting into smaller groups, so that one or more retorts may be worked independently. Consequently in the same setting some retorts are under gaseous heating while others are cold; and when it is necessary to bring the cold retorts into operation quickly, there is the danger on passing the producer gas into the cold compartments, that explosions of sufficient magnitude to strain the brickwork joints may easily occur.

The object of the present invention is to provide means for quickly getting-up the heat in the cold compartments of the setting without disturbing the gaseous heating of the other retorts and without risk of minor explosions. For this purpose the producer-gas flue is subdivided, or a number of producer-gas flues are provided; and each flue or subdivision has an auxiliary air-slide capable of admitting air thereto adjacent to the producer. Each flue is preferably enlarged, and can be temporarily converted into an independent combustion chamber—its communication with the retort compartments or combustion chambers proper being preferably controlled by a damper. When the brickwork has been thus heated so that the gases will ignite at the permanent burners, the auxiliary air inlet is closed, the main air-slides opened, and the gaseous heating of the particular compartment is thus completed.



Toogood's (Robert Dempster and Sons) Arrangement of Gas-Retorts.

Fig. 1 represents in sectional plan and fig. 2 in vertical section a portion of such a setting of retorts. A is the producer; B and C, the producer-gas flues; *a*, *b*, *c*, and *d*, the retorts. Assuming that the retorts *a* and *b* are already heated, and that it is desired to bring also the retorts *c* and *d* into action, the plug D is taken out (or equivalently a slide at the place opened) to admit air to the flue C, which is thus converted into a temporary combustion chamber; the damper E being open to put the flue in connection with the chamber F, and thereby with the heating chambers about the retorts, until the latter chambers are sufficiently heated. The plug D is then closed; the usual secondary air inlets [not shown] are opened; and the gaseous firing proceeds as usual. If, then, the retorts *a* and *b* are to be allowed to cool, the damper G (or its equivalent) can be closed, cutting off the supply of producer gas to that half of the setting, which can also be disconnected in any suitable manner from the secondary air supply.

Purifying Gas.

GLASGOW, A. G.; a communication from C. J. O'DONNELL and A. F. KUNBERGER, of Philadelphia, U.S.A.

No. 12,463; May 20, 1914.

The patentees say: By using oxide of iron in a heated condition for purifying coal and like gas it has been proposed to remove sulphur compounds other than sulphuretted hydrogen—the latter being simultaneously removed or sometimes, for reasons of economy, previously taken out. According to one proposal, such gas containing sulphur compounds (chiefly carbon bisulphide) has been subjected in the presence of water to iron oxide, heated to a temperature of from 80° to 200° C.; and in another instance the utilization of hydrated peroxide

of iron heated to a temperature of from 240° to 420° Fahr. has been proposed for the purpose of decomposing the sulphur compounds and pruducing sulphuretted hydrogen. It is nevertheless well known that different batches of ferric oxide have, under like conditions, and without apparent reason, differed greatly in their purifying efficiency.

Now, after considerable investigation, they claim to have found that, by employing previously precipitated ferric oxide possessing a certain physical structure, or in a particular physical condition corresponding with a "velvety, fluffy, or voluminous feel or appearance" and at appropriate temperature, greater uniformity of quality and certitude of result is obtained, so that its value for removing bisulphide of carbon from gas in a practical manner and on a commercial scale is much enhanced—the material furthermore being effective for removing sulphuretted hydrogen if so desired. The desired properties of such oxide appear, they say, from the researches made to be due to the colloidal character of the material in the described condition.

In practice, ferric oxide of the desired condition is obtained by precipitating it from suitable solutions of iron; the precipitate being normally of yellow or ochre colour, having the probable formula Fe_2O_3 n (H_2O), containing at least a half molecule of water and preferably more. The described hydrated ferric oxide is said to be easily obtainable and is well known as a bye-product. For example, it occurs as a bye-product in the manufacture of alum from bauxite, where the iron occurs as an impurity and is removed by precipitation.

Good results are claimed to be obtained by heating the ferric oxide to a temperature of from 400° to 450° Fahr., more or less, and keeping it at this temperature while the gas to be purified is passing through it. The gas may be passed through the hydrated ferric oxide at the rate of 11,000 cubic feet per bushel of purifying material in twenty-four hours (more or less); and the capacity of the purifying material is very large—meaning that comparatively little of it will purify a large amount of gas.

The temperatures above given are not absolute; but the temperature employed should be such that the purifying material while dry retains its water of formation, and is at a temperature considerably above ordinary temperatures.

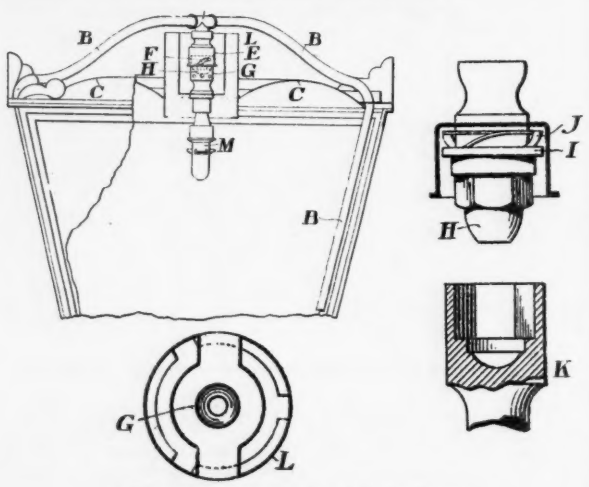
Gas-Lamps.

CARPENTER, C. C., of Old Kent Road, S.E.

No. 16,999; July 17, 1914.

This invention, in reference to inverted incandescent gas-lamps, is directed to the details of the construction referred to in patent No. 5289 of 1909 and No. 25,874 of 1911, as applied to street lanterns.

There is shown a portion of a gas-lamp embodying the improvements; also a plan view of a cylindrical casing or chimney which encloses the upper part of the burner; the burner nipple (the socket or cap surrounding it being in section); and a sectional elevation by means of which the nipple is screwed and unscrewed.



Carpenter's Inverted Street Lantern Burner.

B is the gas supply pipe, part of which extends across the lamp above the reflector C. D is a T-piece inserted into the gas-pipe. The cap or socket E, screwed on to the T-piece, has bayonet slots or grooves F for engaging projections on the upper part of the air-chamber G. H is the nipple, which is screwed on to the nose-piece within the cap. J is a spring washer secured to the nipple above the washer I and tending to press the latter in a downward direction. The nipple H has a squared or hexagonal part provided for screwing and unscrewing by means of a tool K, made to fit the nipple so as to pass it freely through the central hole of the reflector.

L is a metal casing having an inside and outside shell arranged to form vertical flues for the products of combustion, and provided with a bridge-piece furnished with a central hole. The casing L is inserted in the central hole of the reflector, and is supported on the burner-tube G by introducing the lower end of the latter into the central hole and screwing on the burner M.

In fitting together the parts, the cap E is first screwed on to the outside of the T-piece D, and then the nipple H is screwed into the inside of it; the washer I and spring washer J being previously fitted on to the nipple. The screwing-in of the nipple is effected through the hole in the reflector by means of the tool K. The casing is then secured to the burner-tube and burner by screwing the two latter together to clamp the bridge-piece between them. The casing, tube, and burner can then, in one piece, be engaged with the cap E by means of the spring-fitted bayonet joint.

MISCELLANEOUS NEWS.

PORTHCAWL GAS-WORKS PURCHASE ARBITRATION.

Thursday, Jan. 28.

The Case for the Company.

On Thursday of last week and following days, an arbitration took place at the Surveyors' Institution, Great George Street, S.W., to determine the price to be paid by the Porthcawl Urban District Council for the undertaking of the Porthcawl and District Gas Company. Thursday, Friday, and a short time on Saturday morning were occupied in hearing the case for the Company; and this portion of the proceedings is reported to-day. The evidence for the Council and the closing speeches will be dealt with later.

The Hon. J. D. FITZGERALD, K.C., acted as Umpire; and there sat with him as Arbitrators Mr. HENRY WOODALL for the Company, and Mr. FRANK JONES for the Council.

The Counsel appearing were Mr. TYDLESLEY JONES, K.C. (instructed by Messrs. W. & W. M. Bell), for the Company; and Mr. VESEY KNOX, K.C. (instructed by Messrs. Lees and Co.), for the Council.

COUNSEL'S OPENING SPEECH.

Mr. TYLDESLEY JONES, in stating the Company's case, pointed out that the proceedings were taking place under the Porthcawl Urban District Council Act of 1914. The Company was incorporated under the Companies Act, 1862, as a limited liability company in the year 1867, for the purpose of supplying gas and coke, and carrying on the business usually conducted by gas companies. Until 1913, the business was conducted without any statutory powers, and gas was supplied in the urban district of Porthcawl, which really comprised three separate centres of population—Porthcawl proper, Newton, and Nottage. In 1913, the Company went to Parliament to obtain an Act, which re-incorporated them as a statutory Company, and conferred upon them powers to supply gas in the urban district of Porthcawl and certain adjoining parishes. In the Act, a section was inserted by agreement (section 85) which was very much of the ordinary kind—providing that if the Council introduced a Bill in the next session of Parliament, empowering them to purchase the undertaking, the Company should not oppose it. The terms of purchase were then set out. However, the section under which the arbitration was being held was in the Council's Act of 1914; and as there was a provision in this Act that no regard was to be had to the fact that the Company obtained the Act of 1913, nothing actually turned for the moment on the earlier Act. Section 5 of the Council's Act provided that the arbitration should be under the Lands Clauses Acts, and that the Arbitrators or Umpire should not, in settling the amount to be paid, have regard to the fact that the Company had obtained the Act of 1913. So that substantially the undertaking had no doubt to be valued as a non-statutory concern. The Council were to pay the actual costs incurred by the Company in obtaining their Act. The date of transfer, which would presumably be June 24 next, was the date at which the value of the undertaking was ascertainable; but he understood it had been agreed between the parties that no accounts should be gone into beyond June 30, 1914. In extending the time for holding an arbitration or making an award, the Arbitrators had agreed that no evidence should be given which could not have been given if the arbitration had taken place in December. This debarred him from giving evidence about the present consumption of gas in Porthcawl. By section 12 of the Act, it was provided that the Company, in carrying on the undertaking to the date of transfer, should not without the previous consent of the Council enter into any new contract, agreement, or obligation, "except such as shall be in the ordinary course of the maintenance of the works and the proper conduct of the undertaking." Porthcawl was a small seaside town in Glamorganshire; and the urban district had an area of 3737 acres. It was situated about 30 miles from Cardiff; and it appeared to be becoming a residential quarter for the business men of the district. The place was extending very rapidly. Building was going on largely; and the Great Western Railway were "booming the town." In 1901, the population was 1871; in 1911, it had risen to 3544; and in 1914, it was estimated by the Council's witnesses before Parliament at 5000. In the summer, of course, there were large influxes of visitors. The rateable value of the urban district in 1903 was £6000; in 1912, it was £20,993; and he understood it was estimated now at about £24,000. From what he had said, the place was obviously one which offered every inducement to the progress of such an undertaking as the Gas Company. There was no electrical installation in the town. Porthcawl, Nottage, and Newton now practically formed one town; and the gas-works were well situated for supplying the district. They were connected with the Great Western Railway by a siding, and were in an exceedingly good condition—being mostly practically new. There was plenty of land for extensions. Certain tables had been agreed between the parties; and these showed the mileage of mains to be 9¼. As a matter of fact, however, this included a certain proportion of service-pipes; and the extent of the mains was really 8 86 miles. To give a rough idea of the manner in which the undertaking had progressed, he might say that the number of consumers in 1901 was 127; whereas by 1914 it had increased to 966. The sale of gas in 1909 was 10,614,700 cubic feet; for 1913, it was 21,762,000 feet; and for the half year ended June, 1914, it was 10,405,100 feet. In the first half of 1913, the amount sold was 8,913,700 cubic feet; so that 1914 showed quite a substantial increase. The figure for the second half of 1913 (12,848,300 cubic feet) and the first half of 1914 would give the total sale of gas for the last period of twelve months that it was possible to put forward—namely, 23,253,400 cubic feet. The price of gas in 1909 was 4s. 6d. per 1000 cubic feet; and in the following two years it was reduced, first to 4s. 3d., and then to 4s. 2d. In 1912, the price was 4s. 2d., but was then subject to a discount of 6d. per 1000 feet This discount was allowed up to July,

1913, on ordinary consumption and public lighting; but after that date a net price of 3s. 9d. was charged, which was the figure at the present time. The price to prepayment consumers was now 4s. 4½d. per 1000 cubic feet. The Company did not supply fittings to slot consumers; but the price he had mentioned covered the meter and a cooker. If a prepayment consumer had no cooker, he got 2d. returned to him. To ordinary consumers, a meter-rent was charged. The revenue account for the three years 1911, 1912, and 1913 had been adjusted by the Accountants for the two sides by writing back to capital any capital expenditure which had been charged to revenue. Now, however, the accounts for the first half of 1914 were available; and the figures were agreed, though he understood his learned friend did not agree to them being taken for the purposes of valuation. But it would be unfair to take the revenue and expenditure of the Company for any earlier period than the twelve months to June, 1914, because a large part of the works was practically new. The retorts were only brought into operation in the middle of 1913; and the works of reconstruction that were going on in the early part of that year and previously, would, of course, render the accounts for June 30, 1913, a really unreliable guide to the revenue of the Company. They would not reflect the improved position which was due to this new plant. As regarded the future, they said there was a considerable prospective value in the undertaking; and they might, of course, have attempted to forecast what the future revenue would be, and have asked the tribunal to take this into account, and allow something in respect of it. They were, however, not going to do it in this way. What they proposed was to value the surplus land and plant which the Company possessed, and ask to be allowed this value. It would probably be considerably less than any estimate based on the other method; but, at all events, it would be reliable, and a course to which there could be no possible objection. It must be borne in mind that the concern had to be valued as a non-statutory undertaking. There was no maximum price; and there was no limit to the dividend which the Company could pay. As a matter of fact, however, the prices charged compared very favourably indeed with those of other towns in Glamorganshire. He thought they were as low as, or lower than, most of the cases which were fairly comparable, with the exception of two, which related to considerably larger undertakings, and ones which were nearer the coal measures. The Company could divide the whole of the revenue; and he proposed to ask the tribunal to capitalize this revenue upon an appropriate number of years, and then to add something for the value of the land and plant which were not at present in use. There would have to be a small deduction in respect of a deficiency in the scrubbing plant; but with this exception there were no deductions which required to be made for defects or for shortness of plant. The financial tables had been agreed between Mr. Spencer, on behalf of the District Council, and Mr. Robathan, for the Company.

The Evidence.

Mr. *P. E. Robathan*, a member of the firm of Messrs. Jones and Robathan, accountants, of Cardiff, said he had, in conjunction with Mr. Spencer, prepared the financial tables from the books and accounts of the Company. In making adjustments for repairs, &c., they had not decided whether the amounts allowed were sufficient. They simply took the figures and facts as they found them. All the capital was issued for cash, with the exception of one item of £8970.

Mr. Tyldesley Jones remarked that the original capital of the Company was £2500. At the present time the nominal capital was £10,000, divided into 1000 shares of £10 each, of which, in 1913, £8970 had been issued and fully paid up; and premiums had been received thereon of £275. The Company had borrowed £2800—making about £12,000. As against this, a structural valuation had been made of the land and works as at Dec. 31, 1911, which amounted to £15,228, including £1000 for working capital. This was before the reconstruction of the works. Between 1911 and 1914, considerable sums were expended on the works.

Mr. Vesey Knox: Yes; but not out of capital. They were borrowed from the bank, and remained as debts on the Company.

Mr. Tyldesley Jones replied that he thought a certain amount was spent out of profits. However, under the Act which re-incorporated the Company, the capital of the statutory concern was fixed at £63,000, of which £17,940, divided into 1794 shares of £10 each, called the original capital, was to be issued to existing shareholders. So that, in fact, the nominal capital of the Company was doubled—and this in respect of expenditure out of profits. Whether or not the actual amount was justified, was perfectly immaterial now. The Act of 1913 limited the dividend on the original capital to 6 per cent., subject to the sliding-scale. But really what he wanted to point out was the reason why there was some nominal capital which had not been issued for cash.

Examination resumed: They had made an allowance for the depreciation of cookers in addition to what was shown in the Company's accounts. This was the only case in which the sufficiency of allowances had been gone into.

In cross-examination, witness said in 1911 new shares were offered to existing shareholders. This might have been by tender, but not, he thought, in the usually accepted meaning of the word "tender." The result was a premium at the rate of £5 10s. on each £10 share. That was to say, each of the shareholders possessed two shares now for the one share which he paid £15 10s. for, or a payment of £7 15s. each. The people who took up the subsequent issue of £4470 in 1912 obtained the shares at par; so that now each holder of these shares, with the new capital arrangement, had them at a cost to him of £5 for the £10 share. Since the re-arrangement of the capital, the Company had raised nothing by the issue of shares; but they had apparently borrowed from the bank a sum of £7000 in all.

Mr. Tyldesley Jones: Which we shall have to repay.

The Umpire: There are some debenture bonds outstanding. Are they repayable on notice?

Mr. Tyldesley Jones: They are repayable by the Company on notice. So they will not come into the arbitration at all. That is provided for by the Act.

Mr. Vesey Knox (to witness): Taking your table as a whole, no attempt was made to adjust the figures as shown in the Company's books, in order to make a full provision for the plant which had been superseded on the reconstruction of the works?

Witness: We did not go into the question of whether sufficient had been charged to the accounts or not.

Looking at the figures for the works and plant, I see that in the years 1911, 1912, and 1913 there had been spent altogether on the works a sum of between £7000 and £8000. Now, the works which existed before that had been good, during the year 1910, to make 16,000,000 cubic feet of gas. Of course, it is a question for the engineers what a works to make 16,000,000 cubic feet of gas should cost; but the only sums which have been written-off in respect of the plant which made 16,000,000 feet, and which is now being altogether superseded, I think, are the items shown of £500 and £1000, which were taken from the reserve fund and contingency account. The result of this was that the Company were left without any reserve at all. Would you, as an accountant, advise them to go on, if they were to go on, without a reserve?—It depends upon circumstances. I should certainly recommend them in the future to create a reserve.

Taking the half-year's accounts to June 30, 1913, the Company divided their profits up to the hilt that time, did they not?—The Directors of the old Company did.

That is to say, they were not going to allow any great amount of floating cash to pass into the bands of the new Company. Up to then, I think, the dividend had never been more than 10 per cent., had it, on the old undivided shares?—That is right, free of tax.

But for this half year you divided 20 per cent., *plus* a bonus of 6s. 6d. And the Directors left the Company with only £11 9s. 9d. as carry over. Is not that rather a small carry-over for a gas company?—I do not see why they should not divide it, as it was a new Company. They were going out.

You remember they had recited in their Bill, as one of the reasons why they should get the larger capital, that they had £1000 for working capital. Apparently, having made this recital in their Bill, they immediately divide up the £1000, so that it should not pass to the new Company?—I, of course, had nothing at all to do with that. The Company, so far as the limited liability undertaking was concerned, ceased on July 4, 1913. It was a question for the Directors to decide, as that Company were ceasing, whether they would pay away the whole of the accumulated profits in dividend or not; and I did not go into the question of the Bill then.

I see the carry-over at the last half year was only £233. It seems a small sum for a Company which owes £7000 to the bank, and which has no reserve fund. If this Company had to go on, they would have to raise a considerable amount of fresh share capital?—Apparently they would. I believe if shares were issued at Porthcawl, they would be taken up there, at par certainly, if not at a premium.

There is one point which I have not quite understood about the price of gas, as it was explained by my learned friend. I see that apparently what happened in July, 1913, is that the price was raised by 1d. per 1000 cubic feet, because the charge had been previously 4s. 2d., subject to a discount of 6d., and it was then raised to a net figure of 3s. 9d. So that they, with admirable foresight, just prepared for the year they wanted to take as the standard year by putting 1d. on to the price?—I should not say that.

Mr. Tyldesley Jones: They gave everybody a discount of 5d., and only those who paid cash quickly got the 6d.

Mr. Vesey Knox: I am sure they paid 6d. to everybody who did pay cash. The majority of the consumers got the discount?

Witness: The majority did; but I will not say nearly everybody.

Mr. Vesey Knox: One penny per 1000 cubic feet means for 1911 £64 13s. 4d., for 1912 £76 15s. 4d., for 1913 £90 13s. 6d., and for the half year to June, 1914, £43 7s. 1d.

Mr. Tyldesley Jones: I am told it works out at £96 9s. 5d. for the year ended June, 1914.

The Umpire: Is it not the case that if valuation is to be made on income, the nominal capital does not matter?

Mr. Vesey Knox: I think it is only material really from the point of view of the Company trying to issue capital. I think it is only on the question of the multiplier. My contention would be that the position of the Company is now, with this inflated capital, unsound, so that this would depreciate the capital value of their income when they come to issue new stock.

Mr. *J. L. Lambert*, an architect and surveyor, of Bridgend and Porthcawl, said he owned a good deal of property in Porthcawl, and had recently deposited with the Council plans for the building of 254 new houses. These were deposited before the war. He had still considerable faith in the future of Porthcawl. That the gas undertaking had good prospects had always been his view.

Cross-examined: No doubt electricity was a good thing to have everywhere. It made the gas company less independent if there was opposition. He had some time ago signed a statement against the purchase of the undertaking by the Council, in which the following occurred: "You are buying at the worst possible moment just after a development boom—at the top of the market, in fact." This was perfectly explainable.

Mr. Tyldesley Jones (in re-examination): There are a lot of figures in the statement. The view you took, apparently, was that a large sum would have to be paid?

Witness: I think it was about £44,000.

We do not know what information you had which justified such a figure as that; but, at all events, the view you took was that they were to buy a valuable property, and that they would have to pay for it. That is your view still?—That is my view still.

Mr. *William Cash*, in explaining the various figures, said he had investigated the position of the accounts, so far as they appeared in the tables which had been agreed between Mr. Spencer and Mr. Robathan. The important point arising on the terms of the present purchase, of course, was that, being acquired on the basis of a non-statutory undertaking, there was no limit to the amount which the Company might divide. On the other hand, the Company were at the disadvantage that they had not got, as against their freedom from statutory obligations, statutory rights. So far as the raising of capital in the future was concerned, the Company were not prejudiced by the capital re-arrangement made. The table of the capital expenditure from 1904 to

1913 showed that considerable sums had been spent in recent years on reconstruction of works and purchase of land. The £19,094 which was the total down to the end of 1913 included a very large sum for the costs of the Act and conveyance and stamp duty. As to the method of depreciating cookers, a valuation was made of those in use by the Company, assuming that they were all new. The Council knew what were the purchases from 1904 onwards; and they took the difference as being prior to 1904. Then it was agreed that the sum which the Company had written-off down to the end of 1910 should be deducted, and 7½ per cent. calculated each year upon the balance, and 7½ per cent. upon the amount expended each year. This was a very full allowance, because the more usual practice was to deduct the depreciation upon the diminishing value. There had been a substantial growth in the Company's system of mains in recent years. The adjusted profits for the three years to December, 1913, showed that the amounts expended on repairs and maintenance of works and repairs of mains and services, made up a substantial figure. The amount paid in rates exhibited a big jump in 1913. This was largely owing to the rates having been increased, from abnormal causes. For 1910, 1911, and 1912, the dividend paid was at the rate of 10 per cent. Before that it had been 9 per cent. for one year, and 8 per cent. for the three years preceding. Then there was the large distribution to which reference had been made, for the half year to June 30, 1913; and since then they had paid one standard dividend under the sliding-scale of 6 per cent. They might have paid, at the price charged for gas, another 9s. per cent. For the year 1913, the expenditure had been split-up between the two half years. There was no difficulty in doing this, and taking the last half of 1913 and the first half of 1914, to make up a period of twelve months. Inasmuch as the alterations and reconstruction of the works, and the new retort-bench particularly, only came into operation just at the end of June, 1913, this gave more correctly the capability of the undertaking than would the year ended December, 1913. The first half of 1913 would be subject to the dislocation caused by the reconstruction of the works. As to the tables of working, the percentage of gas unaccounted for in 1910 and 1911 showed a great increase; the figures being 16·3 and 16·4. This, however, he had ascertained was due to a broken main. The large expenditure on repairs of mains in 1912 was obviously fruitful, because there was a reduced percentage of leakage, though the figure was, of course, even then higher than in the case of a good many undertakings. In 1913, it was 11·1 per cent. By reducing the leakage, there would be so much more profit.

In cross-examination, witness said he agreed that, deducting the cost of the Act, &c., the outlay involved in the undertaking was about £17,000; but this was after taking from profits £1500. In one sense it might be true that this £1500 was for the purpose of writing-off the works that were replaced. The shares which were issued at a premium of £5 10s., with a 10 per cent. dividend, yielded £6 9s. per cent. He could not make a general observation one way or the other, as to whether or not since 1911 the terms on which shares could be issued by gas companies had improved or otherwise. His view would be that the general tendency of the Money Market had rather carried down gas shares with it, but not so much as some other shares. There had been in some directions an increased appreciation of the value of gas undertakings in the sense that people realized more than they did before what regular dividend-payers gas companies were.

Mr. VESEY KNOX: I happen to have here a list which shows not merely one, but all of the sales by Messrs. A. & W. Richards at the Mart during the year 1914. Will you look at the trend of it?

Witness: Of course, you will understand that on the issue of new capital you are selling capital which has no dividend accruing in the price; and very often the capital is payable by instalments, and possibly does not rank for dividend until the last instalment is paid. All these things affect the price adversely. A lot of these shares have been issued since the war. Speaking broadly on the value of money since the war began, of course, the position is very peculiar. The whole financial position is quite abnormal.

And the whole advantage of this new position is with the man who has money to invest now. He is the man who has many opportunities of buying investments?—He has many opportunities of buying investments as to which it is almost impossible to say what may be the effect if the war is continued. Some gas companies are very badly hit by the war, and others are temporarily doing an enormous business.

Local authorities find it more expensive to raise any capital now. Money has become for the purpose of investment more valuable, looking at it from one side of the table or the other?—Yes, subject to this observation, that local authorities can borrow money by way of temporary loan, and can possibly get it just as cheaply. Bankers are in the peculiar position of having very large sums of money which they cannot employ.

Cross-examination continued: Of course, the Company would be in a stronger position if they had a reserve fund. For this purpose, £200 a year would not be an unreasonable sum to retain from profits. As to third-party insurance, cases of damage on third-party risks were very few and far between. As to repairs of works, mains, meters, and stoves, and depreciation of stoves, the figure for 1911 was 5·84d. per 1000 cubic feet. For 1912, it was 11·15d. But this included the readjustments which Mr. Spencer was able to make, when he found that certain mains had been relaid, but no allowance made to revenue for it. The total for 1913 was 5·27d.; and for the next half year, 5·08d. The figure for the last half of 1913 was 4·18d., which he admitted was small.

Mr. TYLDESLEY JONES (in re-examination): As regards the London Companies, we know that the carriage of coal is rather a serious matter at present?

Witness: I should put it a great deal higher than that. It is an extremely serious matter.

It is very different with a Company like this, which is near a colliery district?—I do not know what the local conditions are. There is difficulty with the railways, as well as with the sea.

The UMPIRE: Have you any view as to the difference in value between a statutory and a non-statutory company?

Witness: It can be looked at from two points of view. As regards a non-statutory company, they are free from obligations; but, on the other hand, they are not in quite so favourable a position as a statutory undertaking. On the whole, I should be inclined to say that the statutory concern was the more valuable.

It follows from what you say that, assuming the income of a statutory company and a non-statutory company to be the same, the statutory undertaking is the less valuable?—No; I should be inclined to say it was the more valuable. First of all, it has the right to go on. It is therefore avoiding any risk of trouble or disappointment hereafter; and it has got its policy and its authority to divide certain sums of money absolutely fixed.

Supposing a man now had £5000 which he wanted to invest, he would be able to invest it in gas securities of a good character returning him 5½ per cent.?—By looking about him, he could, I think. If you are investing, ordinary stock and ordinary stock are comparable; but if you were buying a complete undertaking, some part might be ordinary, some part preference, and some part debentures.

Friday, Jan. 29.

Mr. *J. H. Brearley* said he had inspected the Porthcawl Gas-Works, and made himself acquainted with the district they were supplying. The site was an excellent one. It was about the lowest level in the district. There was, however, only about 40 feet difference between the works and any portion of the district now supplied with gas. There was a siding from the Great Western Railway into the works. The Company had exercised wise foresight in obtaining land giving them scope for expansion. The coal now being used was Welsh bituminous, obtained from collieries about 8 or 10 miles from Porthcawl. It was intended to convert the old retort-house into a coal-store; but at present there was plenty of room to store in the new retort house. About 190 tons of coal could be stored in the former building. The new retort-house was brought into operation in June, 1913, and was an excellent building, much above the class usually met with on a works of this size. Nearly one-half of the house was not at present required for carbonizing; and 300 tons of coal could be stored there quite easily. Thus the Company had at present storage room for about 500 tons of coal under cover. The retort-bench consisted of five beds, of which three were filled in. There were in each of these three settings six retorts, 22 in. by 16 in. by 9 ft. 4 in. They were heated on the regenerative principle; and the capacity of the eighteen retorts, based on a make of 7500 feet per mouthpiece, would be 135,000 cubic feet per day. This gave a weekly capacity of 945,000 feet; but up to the beginning of the war the greatest weekly output was 729,900 cubic feet. Excluding the abnormal state of affairs brought about in December by the presence of troops, the carbonizing plant at present installed showed a margin of 25 per cent. over the maximum requirements. There was room in the retort-house for making quite three times as much gas as was now produced there. The condensing and exhausting plant was sufficient; but there was a deficiency in the scrubbing apparatus, which would be met by the fixing of a rotary-scrubber. The purifiers were of ample capacity; but the pump ought to be duplicated. There were two holders, both in steel tanks, both on the spiral-guided principle, and both prepared for telescoping. Under present conditions, the storage capacity was 72,500 cubic feet; and no need yet existed for increasing it.

The UMPIRE: What was the largest day's make before the war?

Witness: The largest actual day's make was 110,000 cubic feet.

Mr. FRANK JONES: Is that the gas sent out or the actual make?

Witness: The gas made. I take as the factor the average of the maximum week, which is 104,000 cubic feet. I think it is sufficient to take the average of the maximum week, because the holder is really to equalize the demand from day to day.

Examination continued: The pressure that was thrown by the small holder was 3 inches, and by the large one 4 inches. These pressures could be increased by telescoping; but if 3 inches at the works could be maintained at a place like Porthcawl, it would satisfactorily meet the requirements. Having regard to the extension of the business, it would no doubt be wise to telescope the smaller holder. This would be merely to provide for future increases. The present storage capacity was equal to two-thirds of the average daily output of the maximum week. The tar and liquor storage consisted of an underground tank. It would be better to have two of these tanks; and he made an allowance for this. He had prepared a valuation of surplus and deficient works and lands; and he arrived at a balance of surplus over deficiency of £1420. Generally speaking, he would unhesitatingly say that the arrangement of the works was good. As to the price of gas, he had prepared a table showing the make and charges of all undertakings in Glamorganshire of 10 to 41 million cubic feet per annum. There were only two undertakings which were supplying at a less price than Porthcawl—one was Briton Ferry, with a make of 35 millions, and the other Dowlais, with a make of 40 millions. So that the prices which were being charged at Porthcawl were undoubtedly reasonable. In the first half year of 1914, the leakage had been reduced to 9·9 per cent., which he regarded as a very fair figure for a 24 million feet works. An undertaking where consumers were frequently being connected would disturb the mains more often than one of slower growth. At Porthcawl, too, many houses were shut up for a large part of the year. The mains (of which there were about 8·86 miles) were quite good; otherwise the leakage, instead of declining, would increase. The diameters, from 10 inches down to 2 inches, were fair and useful ones. Figures he had drawn up showed that in the four-and-a-half years since 1909 there had been an increase of no less than 120 per cent. in the quantity of gas sold; and the increase had been at a fairly uniform rate. Assuming, as he was told was the case, that there were 1135 houses in Porthcawl, and of these 966 were supplied with gas, there were left about 179 without a supply. This seemed to indicate that there was some scope for development, even among buildings there now. As to the figures, it would be unfair to the Company to take any year which embraced a period prior to July 1, 1913, because the present works were not then in operation. For the twelve months to June 30, 1914, the balance of profit was £1772. The amount for law charges was abnormal at £383. A sum of £10 would be normal; so he added £373, making £2145. Then he had made a deduction for deficiency in repairs; for this purpose multiplying the sale of gas in thousands of feet for the twelve

months by 1·82d. The actual figure of 4·18d. was insufficient. This deduction (which brought the figure for repairs, &c., up to 6d. per 1000 cubic feet) came to £186; and then he took off £31, the profit made on the sale of fittings. This gave a net maintainable profit of £1928, to be capitalized. He put the multiplier at 25 years, which gave an item of £48,206, to which he added 5 per cent. for disturbance and re-investment. The 5 per cent. was particularly claimable under present circumstances. Then he brought in his figure of £1420, and £123 for profits on fittings capitalized at four years' purchase, giving a total valuation of £52,158.

The UMPIRE: You say that the figure for maintenance depends on the nature of the business. What is the exact point in the nature of the business that is in your mind?

Witness: The point is that here they have practically no machinery. They do not maintain consumers' incandescent burners; and they have no prepayment fitting installations. In these particular respects, they differ greatly from many other undertakings.

Mr. FRANK JONES: If they had included these things, what figure would you have put?

Witness: Probably 8d. per 1000 cubic feet.

Cross-examined: He had not made a structural valuation, because he had been told that in this particular case it was superfluous. The 1-inch pipes were not mains, but services. He did not consider a pipe was a main because it supplied two or three houses, or even half-a-dozen. Obviously, if they were taken into account it would increase the proportion of small mains.

Mr. VESEY KNOX: It is technically a main. You would be bound to supply any other house from this main, if it was within the statutory distance from it. That is the test, it seems to me.

Mr. TYLDESLEY JONES: There is no obligation. You must remember that we are a non-statutory Company.

Witness, in further cross-examination, said he had been informed that a number of trial holes had been made in the district; and it might be that out of 37 cases there were only 13 in which the main was laid 2 feet deep or over. Where mains were about 1 foot beneath the surface, he was told it was in grass on the side of the highway. Many of the mains were under the kerb. Under present conditions, in the main roads of Porthcawl, 2 feet of cover would be suitable. His 6d. per 1000 feet for repairs, &c., he would split up into 3d. for works and 3d. for mains, meters, stoves, and depreciation. It might be that a five years' average for repairs, &c., at Longwood was 8·36d.; but this included maintenance of burners and shop lamps, some slot installations, and some machinery, together with a sulphate plant, which they had not at Porthcawl. The majority of small works, he believed, had not one setting of retorts in reserve. Some of the retorts needed re-setting. This, however, was not because they had been "driven to death," but because the bench was a new one, and there had probably been a little subsidence. The more experience he had of storing coal in the open, the more convinced he became that it was perfectly satisfactory. The freedom from liability to coal fires more than compensated one for the slight reduction in the gas yield from the coal. He maintained that it was possible to start an undertaking without working capital. They would begin to collect from the slot-meters within six weeks. Wages would be obtained by cash sales of coke.

Mr. VESEY KNOX: This could not, of course, be called a first-class Company?

Witness: Personally, I am quite certain that I should prefer to invest in the Porthcawl Gas Company than in (say) a Metropolitan Company, because of the prospects under the sliding-scale.

Apparently, you think its prospects even better than those of the British Empire, because the War Loan yields just over 4 per cent. You can buy it now at that; and you put this Company on a 4 per cent. basis?—Yes.

What would you have given if it had been a statutory Company?—At the present time I should probably have given about 26¾ years.

The British Empire is being left far in the rear. Have you taken into account at all the fact that it was a non-statutory Company carrying on business within the statutory area of a statutory Company?—I have not. It does not make any difference. I did not know that.

Mr. VESEY KNOX: The Act was passed in 1868, and there was power to have works in Porthcawl.

Mr. TYLDESLEY JONES: And they were never exercised.

The UMPIRE, after some further questions, said: There is no doubt that it is a compulsory sale on the face of it. What, if anything, that entitles them to, is quite another matter.

Mr. HENRY WOODALL: It has been suggested that the capital per million cubic feet of gas is high here?

Witness: If we deduct the cost of the Act and surplus works from the capital represented in the balance-sheet, the capital is very reasonable indeed.

Mr. HENRY WOODALL: I think you will find it works out at £650 per million feet.

Mr. FRANK JONES: You said you had come to the conclusion that open-air coal-stores were actually preferable. Would you say that this was an accepted theory in most gas-works?

Witness: No; I would not say that.

Mr. TYLDESLEY JONES: The capital works out at £735 per million cubic feet.

The UMPIRE: I rather gather, from answers you have given, that you have not made any allowance, in arriving at the number of years' purchase, for the existing state of the Money Market?

Witness: No; nor for the conditions of the war.

Mr. *Sidney E. Stevenson*, who was next called, said the works were in very good condition, except for the scrubber, which ought to be replaced. There was excess capacity in the land, retort-house, and meter-house. The retorts were capable of making 7500 cubic feet per mouthpiece, with six-hour charges. The storage provided by the existing holders was sufficient. The undertaking possessed considerable prospective value. The increase in the consumption of gas had averaged for twelve years 22·48 per cent.; and during the last three years it had averaged 17·63 per cent. He put in a valuation which totalled £52,450. The figures were, he said, very much the same as those of Mr. Brearley. Like Mr. Brearley, he put down 1·82d. per 1000 cubic feet for repairs, &c., to bring this figure up to 6d.; and he took a multiplier of 25 years, with 5 per cent. for disturbance and re-investment. For fittings and profit, he took five years' purchase. A multiplier of 25 years he regarded as very moderate; and had it been a statutory company, he would have put about two years more.

Mr. VESEY KNOX (in cross-examination): Almost all your figures are the same as Mr. Brearley's. I suppose you agree with his answers in cross-examination, as well as in the examination-in-chief?

Witness: Yes.

Mr. FRANK JONES: Do you agree that coal-stores are not necessary to a gas undertaking?

Witness: I would prefer to have them.

The UMPIRE: From your point of view, what was the object in building a retort-house equal to an output of three times the existing make?

Witness: Only with the prospect of future extension. It is a reasonable course to take.

Mr. *Samuel Walker*, Works Manager of the Company, said it was true that some of the retorts needed re-setting, but not all of them. He joined the Company in May, 1910, and since then, a great deal of work had been done in regard to mains. A new 10-inch main had been laid from the works to the centre of the town; and numerous 2½-inch mains had been replaced by 4-inch ones. The pipes taken up were practically as good as new, though they had been down forty years. There was evidence of damage to only one pipe from heavy traffic; and another main was broken where some quarrying or other work was carried out. As a rule, he regularly made 9000 cubic feet per mouthpiece per 24 hours. The roads were opened, as already stated, at 37 places by the Council, who selected the spots; and all the pipes exposed were in good condition.

Cross-examined: He was afraid there had been some subsidence in connection with the retorts. The maximum make had been 123,900 cubic feet; and this might work out at somewhere about 7000 cubic feet per mouthpiece. There might at times be an advantage in having a little more storage; but he had not recommended the Directors to provide more. With the maximum output of 113,000 feet a day before the troops came to Porthcawl, more storage would not be necessary. He charged every four hours when producing 9000 cubic feet per mouthpiece. With six-hour charges he would not expect to get more than 7000 cubic feet. There had been a few complaints as to insufficient pressure.

Re-examined: He had never known a gas company who got no complaints. They got complaints if they were too good, as well as too bad. There had been one or two formal complaints made by the Council.

The UMPIRE: Have you any expectation that the results will be less satisfactory in the future than they have been in the past?

Witness: None at all.

Mr. FRANK JONES: Do you think it necessary to have your coal under cover?

Witness: Most of the coal we get would not be suitable to be stored outside. But the coal we have now, and which I recommended, in any case I would not store at all—not in the dry. It is a soft coal; and I like to use it fresh.

Saturday, Jan. 30.

The UMPIRE, on taking his seat, pointed out that the date for the Arbitrators to make their award would expire on Feb. 12, unless an agreement was arrived at between the parties to extend the date. It was therefore decided to alter it to March 1.

Mr. *John Elias* stated that he became Secretary and General Manager of the former limited Company in 1901; and when the Company was re-incorporated in 1913, he continued in this office. At the present time, the number of consumers on the books was 967, and of meters 1023. Last June, there were 995 meters, and of these 650 were prepayment. The number of cookers on hire was 605; and of these 487 were used by prepayment consumers, without any specific charge being made for them. The remainder were let to ordinary consumers at a rental. The number of connections existing in 1901 was 127; in 1911, it was 712. So that 585 consumers had been put on in this period of ten years. In 1912 there were 87 new connections made; in 1913 there were 91; and in 1914, up to June, 105. Since June the figure had been smaller—in fact, 28.

Cross-examined, witness said the last issue of shares, at par, which took place in 1912, was before it had been decided to go to Parliament. An agreement was made with the District Council by which the Bill passed as an unopposed measure. It was decided that there should be a purchase clause put in; but the agreement was only come to after much discussion as to the terms of the clause. No extra effort had been made to develop the undertaking since the purchase was decided upon; the Company had always done their best. There had been sales of shares "in the open market;" but he was unable to say whether they had taken place through stockbrokers. He gave details of various transfers during the past few years.

Re-examined: There was considerable discussion over the standard price before an agreement was come to with the Council.

The UMPIRE said there were negotiations, which resulted in a settlement, which was afterwards carried into the Act.

Mr. TYLDESLEY JONES wished to show it was by no means a foregone conclusion that the ratepayers were going to purchase. He should take the point that the sale was a compulsory one.

This concluded the case for the Company.

Sale of Redditch Gas Stock.—The sale of Redditch gas stock, to which attention was duly drawn in our advertisement columns, took place at Birmingham last Thursday, when Messrs. Edwards, Son, and Bigwood conducted a very successful sale of £7500 of 5 per cent. preference and £7500 of ordinary stock (dividend in recent years 5½ per cent.) in the Company. After good competition, all the 170 lots were sold. The preference stock realized from £102 to £103 per cent., and the ordinary stock from £100 to £100 10s. per cent. The total amount realized was £15,201 15s. At a similar sale of preference stock in November, 1913, the highest price realized was £102 7s. 6d. per cent.

A SETTLEMENT AT CHELTENHAM.

We are glad to be able to state that the dispute at the Cheltenham Gas-Works, which at one time it seemed possible might lead to a strike, has been amicably settled.

The demand of the men was (1) for an increase of wages to those who did not share in the increase granted by the Company some time ago; (2) for a schedule of work; and (3) for the recognition of the Amalgamated Society of Gas Workers, Brickmakers, and General Labourers. Notices of the men were handed in to cease work last Saturday, unless their demands were met; and the Directors during the week gave the matter earnest consideration. The result was that on Thursday negotiations were opened by the Engineer and Manager (Mr. James Paterson) writing to say that he was prepared to meet a deputation of the men. A deputation, representing all grades of the workers, was appointed; and after a long discussion terms to the entire satisfaction of both sides were arrived at. These were reported to a full meeting of the men in the evening, and accepted. This indicates the existence of a feeling of confidence between the parties which it is to be hoped will long remain.

It is reported that what the terms amount to is that the men obtain concessions of from 1s. to 5s. per week for those employees who did not share in the previous rise—a small number; extra men are to be put on to relieve the strain of work; and a schedule of work will be given to the retort-house men. The recognition of the union is not accorded; but as it is agreed that a workers' deputation shall be received at any time when the men consider they have a grievance to ventilate, or that they wish to make any suggestions, the men waived the point. No length of time is specified in the agreement as marking its duration.

GAS SUPPLY IN LANARKSHIRE.

The Middle Ward District Committee's Action.

The movement initiated by the District Committee of the Middle Ward of Lanarkshire for extending their powers for the supplying of certain areas with gas, is progressing. In December they adopted a resolution that the Burghs Gas Supply (Scotland) Acts, 1876 and 1893, as modified by the Lanarkshire Gas Order Confirmation Act, 1914, should be adopted in, and applied to, the Bellshill and Mossend Special Lighting District, and to two extensive areas of the county adjacent thereto. They also passed a similar resolution with regard to the Larkhall Special Lighting District, and adjoining areas. The District Committee, with the consent of the County Council, have now, as already mentioned in the "JOURNAL," decided to apply for a Provisional Order primarily in connection with the water supply in the northern districts of the middle ward of the county, and (*inter alia*) to give them powers to lay pipes beyond their area for the purpose of supplying gas to any combined lighting districts. This proposal has brought the Committee into trouble with the large burghs of the middle ward, such as Hamilton, Motherwell, Airdrie, and Coatbridge, who are insisting upon certain protective provisions being made in the Order that will safeguard their pipes and supply areas—a protection which the District Committee have not as yet seen their way fully to concede.

For the past few months the Committee have been feeling their way in the matter of manufacturing and supplying gas on a larger scale, as they are at present supplying electric light in the Cambuslang area; and the latest phase of the question was discussed last Friday at a meeting of the District Committee over which Mr. George Fraser presided. The matter came up on a minute of the Sub-Committee on Gas Supply, which set forth that, with regard to the Bothwell and Uddingston gas supply, the Clerk had written to the Secretary of the Bothwell and Uddingston Gas Company, inquiring as to whether there was any likelihood of his Company being disposed to consider favourably the selling of their undertaking, and whether his Directors would meet a small Sub-Committee to discuss such a proposition. The Secretary had replied, stating that the Company would be pleased to receive the members of the Sub-Committee at their offices; and the conference had taken place on the previous Monday.

Mr. FRASER now reported, in reply to questions by councillors as to the expediency of purchasing the undertaking, that the Bothwell and Uddingston Gas Company was a statutory one, and that the District Committee had no right to interfere with their undertaking. Indirectly, however, they had been approached in the matter; the reason being that experts were at present considering the laying-out of the middle ward as a gas area under the District Committee. It was proposed that the ward as a whole should be worked from certain centres. If they acquired the Uddingston gas undertaking at a reasonable cost, it would be within the bounds of possibility that the town might have superseded somewhat all the other areas as a centre. Before the Committee could deal with the matter in a practical way, they must be advised by experts, who would be asked to inform the Committee as to what would be a fair price to pay for the undertaking if the Company were willing to sell. The works were not in the market, and the Company simply said to the District Committee: "Make us an offer. If the offer is reasonable, we will sell; if not, we will remain as we are." But the first step was for the Committee to be advised by experts as to the suitability of the Uddingston Gas-Works if incorporated in the scheme, and if they could be had for a price at which it would be worth the Committee's while to buy. He formally moved that the Committee employ experts.

Mr. TOUNER asked why the Bothwell and Uddingston district was being taken, seeing that there were other districts as suitable for supplying as large areas of the county. When the question of gas supply was first raised, it came from the Blantyre district, the inhabitants of which were paying an enormous price for their gas, and they had got into touch with the Town Council of Hamilton, the neighbouring local authority, who were supplying gas at 1s. 8d. per 1000 cubic feet.

Mr. SHANKS seconded the motion, and said he thought it would be better for all the gas-works in the middle ward to be bought up. But the Committee must first, as Mr. Fraser had suggested, find out their real value.

Mr. FRASER said a difficulty, in the legal position, was whether they could link-up all the different works; and, on the advice of the Clerk and the experts, they had taken the centres which the latter recommended. There was no reason for thinking that they were slighting the Blantyre district; but this was not so well situated for being centrally worked. If, however, they got their Order, there would be no difficulty in getting district linked-up with district; and Blantyre would come to be served in the same way as the rest.

Mr. LOVE thought Mr. Fraser's proposal was departing from the minute before them. He said he could not agree with the mover of the motion, because he considered that the men who could not tell them what they considered their undertaking was worth did not want to sell it. It was unbusinesslike, therefore, to spend £100 or £200 on expert advice as to its value, before they learned what the proprietors would sell at. He moved an amendment against employing an expert at the present time.

Mr. BROWN seconded the amendment, remarking that, unless they got a reasonable offer from the Company themselves, he did not see why they should suggest a price to them.

On a division the amendment was carried by 9 votes to 6. Otherwise the minute was adopted.

NATIONAL DYE SCHEME.

Modified Proposals.

The Board of Trade have issued the following statement announcing fresh proposals formulated by the reconstituted Committee of users of dyes appointed within the last few days to confer with representatives of the Board regarding a scheme for placing the British dye-ware industry on a footing which will make this country independent of supplies from Germany.

As already announced in the Press, meetings held of the enlarged Committee appointed to confer with the Board of Trade as to a national dye scheme have resulted in a unanimous decision in favour of a modified scheme, which, it is believed, will be acceptable to the various interests concerned. The full details of the scheme adopted will be made public after a further meeting of the Committee has been held; but it is now possible to indicate its general lines, which differ in certain important respects from those of the scheme already made public.

The proposal is to form a Company with an initial share capital of £2,000,000, of which £1,000,000 will be issued in the first instance. The Government will make to the Company a loan for 25 years corresponding to the amount of share capital subscribed up to a total of £1,000,000, and a smaller proportion beyond that total. The Government advance will bear interest at 4 per cent. per annum payable only out of net profits; the interest to be cumulative only after the first five years. There will be no compulsory sinking fund; but the dividend on the shares will be limited to 6 per cent. per annum on the paid-up share capital, so long as any part of the Government's advance is outstanding.

In addition, and with the desire of promoting research, the Government have undertaken for a period of ten years to make a grant to the Company for the purposes of experimental and laboratory work up to an amount not exceeding in the aggregate £100,000.

With the object of securing that the Company shall remain British, and of preventing undue preference or encroachment on the businesses of British manufacturers of products other than dyes and colours, the Government will nominate two Directors of the Company, with special powers in relation to these matters. There is, however, no intention of using these powers to prevent the Company from giving priority to shareholders in the supply of dyes or from making the bye-products incidental to the manufacture of dyes.

The terms of the proposed agreement to be entered into between users of dyes and the Company have been considerably modified in favour of the users.

An option has already been obtained for the acquisition of important dye-making works, and negotiations for other options of a like character are in progress; while there is reason to believe that arrangements satisfactory to both parties can be made with important producers in Switzerland. Early steps will be taken to develop the supply of dyes, both by the enlargement of the plants of the undertakings acquired and in other ways.

It is proposed that the Company shall take powers to arrange for the assistance of a committee of experts conversant with the dyeing trade and its requirements; and in this connection Lord Moulton has promised to give the Company the benefit of his assistance and advice.

It is believed that the steps thus taken will provide for the full and immediate utilization of available resources for the manufacture of dyestuffs, and will provide an organization capable of expansion so as to deal with the problem on a more comprehensive scale.

Littleborough Gas Company.—The annual meeting of the Company was held last Thursday; Mr. J. C. Hudson presiding. It was reported that the gas sales had realized £5010, compared with £4811 the previous year. Residual products returned £1415, as compared with £1550; and the revenue profit was £1326, against £1437. The available balance, subject to the half-year's dividend, was £3920. A dividend at the rate of 10 per cent., less income-tax, was declared.

A Cool Request.—A letter from the Gas Company was read to the Hastings Board of Guardians at their last meeting, declining to make any offer for a quantity of gas-fittings which were in use before the adoption of the electric light. The Company explained that it was not their practice to purchase second-hand fittings. In the course of a brief discussion, it was stated that the fittings were by no means obsolete; and the Clerk intimated that he had no doubt offers could be obtained from other quarters.

TOTTENHAM LIGHT, HEAT, AND POWER COMPANY.

The Half-Yearly Report and Accounts.

In the report to be presented at the half-yearly general meeting of the Company on Saturday next, the Directors state that the accounts for the half year ended Dec. 31 show that, after providing for interest charges, there remains a profit balance of £15,123. Adding the amount brought forward from the previous half year (£37,833), and deducting the sum required for the Inland Revenue stamp duty on the conveyance of the Enfield undertaking (£2509), the sum available for distribution is £50,447. The Directors recommend payment of the full statutory dividends of 5 per cent. per annum on the preference stock, 7½ per cent. per annum on the "A" stock, and 6 per cent. per annum on the "B" stock. This will absorb £24,886, and leave £25,561 to be carried forward to next account. The sales of gas show an increase of 0·21 per cent. over those of the corresponding six months of the previous year; and there has been an addition of 2138 to the number of consumers, and 4005 to the cooking and heating stoves in use. The erection and equipment of the generating station for electricity at Wood Green was unavoidably delayed by circumstances connected with the war. It was completed the third week in December; and on Dec. 22 the supply of current commenced to be registered on the consumers' meters. It was therefore too late for any revenue account for the electricity undertaking to form part of this half-year's accounts.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £117,629; the rental of meters, stoves, &c., and the maintenance of incandescent mantles produced £28,575; residuals yielded £27,365; and the total receipts amounted to £173,823. The principal items of expenditure were: Manufacture, £95,489; distribution, £34,666; management, £6878—the total expenses being £154,137. The balance carried to the net revenue account is £19,686; and the total standing at the credit of this account is £50,447. The statements relating to manufacture show that in the half year 1,237,083,000 cubic feet of gas were made, and 1,116,687,000 cubic feet sold; the total quantity accounted for being 1,139,191,000 cubic feet.

SMETHWICK AND COKE-DUST BRIQUETTES.

The Smethwick Gas Committee have for a considerable time had under consideration the question of purchasing a briquetting plant for the conversion of coke dust into briquette fuel; and they have accepted a tender for such a plant (subject to the due fulfilment of certain conditions as to satisfactory working, and including favourable terms for the Committee on the installation of other plants), at a cost of £740.

The action of the Committee in installing this plant, which has already been approved by the Council, is the outcome of experiments at the works, the object being to utilize about 1000 tons of coke dust made annually in connection with the undertaking, which has hitherto been regarded as waste. The tests show that the briquette from coke dust is of equal value in heat and equal in weight to the best coke they produce at the works; and the Committee now feel strongly that coke dust is much too valuable to be thrown away. A good sum of money has been spent by the Committee in the past in providing storage for coke dust which they have not been able to get rid of; and large quantities have been sent away in boats to put on tips. Now the coke dust will be made into briquettes and burnt under the boilers at the gas-works. It is estimated that they will get all the necessary power for running the works from these briquettes.

The Committee are hoping later on to make their discovery apply beneficially to domestic consumption; but further experiments will have to be made to arrive at a satisfactory mixture for household purposes. At present, the Committee are congratulating themselves upon having arrived, after some two years of experimenting, at a very good mixture for their own use at the works.

BLACKBURN GAS-WORKS MANAGEMENT.

Last Thursday, a meeting of the General Purposes Committee of the Blackburn Corporation adopted the report of a Special Sub-Committee appointed to deal with matters at the gas-works. The report is as follows:—

(1) That the Gas Department requires reorganization, which should be undertaken by the Gas Committee; and that Sir Corbet Woodall's report be referred to the Gas Committee and the new Engineer, when appointed, for full consideration.

(2) That, while the Parks Committee should retain the supervision of the street lighting, whether by gas or electricity, and should be the authority to direct what additional lamps should be provided and in what situations, the Gas Committee should have the entire management and control of the actual work of providing, lighting, and repairing the gas-lamps required for this purpose.

(3) That, having regard to the importance of encouraging the sale of gas in the manner pointed out by Sir Corbet Woodall, regard should be had, in the appointment of Gas Engineer and Manager, to commercial as well as technical qualifications and experience.

(4) That, in view of the works of reconstruction to be undertaken, and the desirability of carrying them out without the interposition of a Consulting Engineer, and in view also of the additional duties imposed and the qualifications required, the salary of the Gas Engineer and Manager should not be less than £800 per annum.

Having regard to the increased prices now being charged for mantles, &c., the Walthamstow Urban District Council have been recommended to increase the charge for the maintenance of gas-burners in schools from 2½d. to 3d. per burner per quarter.

COKE FOR STEAM-RAISING.

The Influence of Fuel Costs on Steam-Waggon Design.

Under the sub-title given above, Mr. E. W. L. Nicol, the Secretary of the London Coke Committee, contributed a short article to the number of the "Commercial Motor" for the 21st ult.

He wrote: The commercial value of motor haulage to the average user is determined largely, if not principally, by the influence of fuel costs. The advantages of the internal-combustion engine, using volatile oil-fuel, for certain classes of work, are well known; and it is therefore proposed to confine these remarks to the solid-fuel motor and the correlation of boiler design and cheap fuel—leaving out of the question entirely the fluid form of fuel.

Without entering into the controversy of the relative advantages of water-tube *versus* fire-tube boilers, it should be recognized that the latter, usually of the locomotive type, are designed primarily to burn natural coal fuel, containing a full proportion of volatile matter; the elongated tubes being intended to absorb and transmit heat radiated from the flame and convected from the hot combustion products. That this type of boiler has a splendid record for faithful service behind it cannot be gainsaid. The fact that over 90 per cent. of the evaporation takes place immediately over and around the fire-box has been equally well demonstrated; and this would appear to raise some doubt as to the evaporative value of the elongated tubes and the additional weight incurred by their use.

In recent tests conducted by the R.A.C. Technical Committee with a "National" coke fuel three-ton motor waggon, the average heat expenditure was demonstrated as being approximately 47,000 B.Th.U. per mile loaded; the average fuel consumption being 3·8 lbs. and the calorific value 12,468 B.Th.U. per pound as fired. This figure is a little above the average.

At current rates, delivered in the London area, potential heat units may be purchased as follows:—

	B.Th.U. per Pound Dry.	Cost Delivered per Ton.	B.Th.U. Obtainable per Penny Cost.
Welsh coal, good . .	15,200	29s. 6d.	95,912
Do., average . .	14,140	24s. od.	108,878
Gas coke	13,100	18s. od.	135,847

In the best interests of both builder and prospective owner, it should be well for the designer to keep in mind the above figures, which are applicable to most districts. Obviously, the most efficient boiler will be that which offers the greatest proportion of its surface to the effective action of direct radiant heat, and so designed as to afford unrestricted circulation and ample grate area. It would appear, therefore, that the water-tube boiler, with its rapid circulation, should show the best results with cheaper non-volatile fuel, although the loco. type, fitted with one of the well-known aids to improved circulation and a well-designed grate, should closely follow the former in efficiency, while losing none of its well-proved hard-wearing qualities.

The persistent conservatism of some designers in retaining the loco. boiler, with its comparatively heavyweight handicap, must sooner or later give way before the influence of increasingly-keen competition in reducing running costs, and of possible taxation, based on axle weight. The objections raised to boilers of the water-tube type will be found, on analysis, amenable to rational design and the provision of adequate facilities for cleaning. In the past it has been the failure of access-door joints chiefly that has brought disfavour upon this type of boiler, which in other spheres has proved not only the safest and most reliable, but the quickest to respond to heavy intermittent demands for steam.

COVENTRY AND THE BRITISH COMMERCIAL GAS ASSOCIATION.

A discussion took place at the quarterly meeting of the Coventry City Council with reference to a minute of the Gas Committee which stated that it had been resolved that the Committee should contribute the sum of £140 7s. 6d. to the British Commercial Gas Association—being the annual subscription due at the rate of 2s. 6d. per million cubic feet of gas made during the year.

An explanation of this payment was sought by Alderman A. H. Drinkwater, as he thought it a very large amount to contribute to the Association. Mr. T. Quinney (the Chairman of the Gas Committee) replied that the payment was at the uniform rate paid by a great number of gas companies and corporations; and the Committee were of opinion the money was well invested. The uses of gas were widely advertised; and subscribers obtained a tremendous amount of publicity in connection with this matter, which they could not possibly secure if they simply paid £140 for advertising locally. Mr. A. S. Hill considered the sum a large one, and that the Council ought to have more information about the Association and what was done with the money which the various undertakings were contributing. He moved an amendment that the minute be referred back for further consideration; and Mr. S. G. Poole seconded this—urging that the best form of advertisement the Department could have was in the matter of satisfied customers.

Mr. E. M. C. Instone asked if any good purpose would be served by referring this matter back, as he was under the impression that the payment of the money was an obligation they entered into twelve months ago. Alderman W. H. Batchelor (a former Chairman of the Gas Committee) also argued in support of the Committee's decision; remarking that it was a moral obligation the Council should face. If each individual undertaking were to set about advertising gas, or the uses of gas, to the extent the Association did, it would cost them an immense sum of money. The bulk of the receipts were spent in advertising. There was no doubt about this; and if members had seen the papers, they would have noticed whole-page advertisements in the leading journals of the country illustrating and advertising the uses of

gas. He could not tell them what direct benefit they themselves had received; but what was good for other undertakings should also be good for Coventry. He firmly believed that it was the right thing to do. If they did not pay this subscription, they were committing an immoral act, because they would be taking an advantage of other people's money. Others would be paying for this advertisement; and they in Coventry would be sharing in the benefit of it without participating in the liability. Unless they passed a resolution that they did not believe in such an Association as this, they ought to agree to the payment of the subscription.

After Mr. H. W. Barford had supported the amendment, on the ground that the amount was too large, Mr. W. Jones took the other side, and asked how many more times this question was going to be discussed. Why should the Gas Committee, because this undertaking was a municipal concern, isolate themselves from the whole of the trade? Could they find a trade which was not organized? The chain trade and the bicycle trade were organized; and they retained a staff of clerks and managers. Why was this? To keep their wares before the public, and to keep themselves in touch with everything that was going on in the trade. This matter was discussed very fully on the Gas Committee; and it was considered that they were receiving more than value for their money. Alderman W. Lee, too, said he was opposed to the amendment. He was quite sure that if the Gas Committee had looked upon the payment as a waste of money they would have been the last persons in the world to have recommended it. The opposition was very much stronger this year than it had been before, for the reason that they had all become electric light users. Otherwise they would have been glad to welcome any experiments or any expense which would tend to develop the best properties in gas. When they remembered the vast number of people there were in Coventry who had to use gas, he thought they should be willing to pay this small amount of money.

On a division, the amendment was defeated, and the Committee's minute providing for the payment of the money was confirmed.

THE CLYDESIDE TUBE COMPANY AND ITS GERMAN INTERESTS.

A Circular by Messrs. Stewarts and Lloyds.

Under date of Jan. 28, Mr. A. C. Macdiarmid, the Secretary of Messrs. Stewarts and Lloyds, Limited, of Glasgow, has circularized their customers regarding certain misconceptions that appear to have arisen in some quarters as to the nature and extent of the German interests in the Clydeside Tube Company, Limited, which is controlled and managed by Messrs. Stewarts and Lloyds, Limited. In order to correct any such misconceptions, the following statement of facts is made.

The "Wittener Stahlrohren Werke Gesellschaft," of Witten, Germany have been manufacturing weldless steel tubes for a number of years, according to certain patents and processes the property of that Company and of Mr. Heinrich Stuting, their Engineer; and their manufactures had a large market in the United Kingdom. With this fact before them, the Glasgow house in 1911 thought it desirable to enter into negotiations with the Company with the object of putting down a plant in Scotland; and one has now been erected.

Having regard to the experience acquired by the Wittener Company and Mr. Stuting, both in the construction of the special plant required and in the processes of manufacture, it was considered advisable that the arrangements to be made should be such that the co-operation of the Wittener Company and of Mr. Stuting would be secured in the practical development of the new venture. This could not have been done by a payment in cash; and accordingly, instead of trying to purchase outright the patents and processes and Mr. Stuting's experience and services, the Clydeside Tube Company, Limited, was formed, with a capital of £175,000, divided into 175,000 shares, of which Messrs. Stewarts and Lloyds and their nominees held one half, and the German Company, Mr. Stuting, and nominees the other half. The sum of £62,500 has been paid by the German Company on account of their holding.

Notwithstanding the equal division of shares, it is pointed out that the Articles of Association secure to Messrs. Stewarts and Lloyds the perpetual control and management of the Company, by provisions as to voting at Directors and shareholders meetings, and as to general management.

The circular concludes: "Needless to say, all the information required with regard to this Company under the Trading with the Enemy (Amendment) Act, 1914, was forwarded to the Custodian for Scotland immediately on his appointment; and apart from this we may add that shortly after the outbreak of war we informed the Imperial authorities fully as to the whole position. So far as Stewarts and Lloyds are concerned, we may state that, with over 4000 shareholders, there is only one shareholder of German nationality, and his holding is £600."

Fatal Fire Caused by a Gas-Jet.—A lady named Morgan, 52 years of age, who lived with an invalid sister at Ilfracombe, was fatally injured late at night last Monday week. Her dress became by some means ignited by a gas-jet; and after the fire had burned itself out, she remained unattended until the following morning.

Durham Gas Company.—The Directors in their annual report state that, after deducting the interim dividend at June 30, the accounts show an available balance of £3652, and, after paying the ordinary dividend (for which £2595 will be required), there is a net balance of £1056. This they consider very satisfactory, in view of the increased price of goods generally, and the fact that a much larger amount than usual has had to be spent on the works. They recommend a dividend for the half year just ended of 5 per cent. on the original and 3½ per cent. on the additional capital, making a total for the year of 10 and 7 per cent. respectively.

ENEMY PATENT RIGHTS.

By virtue of the provisions of the Patents, Designs, and Trade Marks (Temporary Rules) Act, 1914, any person may apply to have any of the hereunder patents revoked or suspended, providing that such person applying can satisfy the Board, or any person whom they may appoint for the purpose, that the patentee or licensee is the subject of a state at war with His Majesty, that such person applying intends to manufacture, and "that such revocation is in the general interests of the country or of a trade." The list has been compiled by Messrs. Hughes and Young, Patent Agents, Nos. 55 and 56, Chancery Lane, London, W.C., who will furnish our readers with any further information they may require.

28,496 (1912).—LANGHANS, R., "Gas-burners."
29,182 (1912).—KERPLEY, A. VON, "Gas-producers."
29,371 (1912).—KOPPERS, H., "Gas-retorts, &c."
21,458 (1913).—DEUTSCHE GASGLUHLICHT, "Lamps."
20,487 (1913).—BILLAND, C., "Gas-mains."

GAS FUEL BUSINESS IN THE UNITED STATES.

Statistics of Progress.

At the last Meeting of the American Commercial Gas Association, a report was submitted by Mr. J. J. BURNS on behalf of the Committee on Domestic Fuel Appliances. The following are some extracts from it.

A study of present conditions among gas companies shows that from 60 to 85 per cent. of the consumers use gas-ranges, which means that there is still a great deal of new business waiting to be developed on this particular appliance alone. The Committee, realizing this fact, endeavoured to investigate conditions among gas consumers, to find the reason why everyone was not a fuel user.

In order to obtain information as to the consumers' views of the value of gas appliances, the Committee sent out a letter to 38 new business managers, representing companies in all parts of the country. Further than this, the members, together with their friends, approached a total of 200 consumers and non-consumers, discussed the domestic fuel proposition in a general way, and obtained their opinions in the matter.

It was found that the value of the gas-range was fully appreciated by the majority of consumers, but in nearly every case there were some disadvantages to set against the advantages. There were very few complaints as to the results obtained from a gas-range; the general opinion being that it is the best method of cooking. The complaints of poor results were in the majority of cases due to inefficient combustion, and were very easily removed when brought to the attention of the gas company.

The value of the water heater, we regret to state, is not so generally recognized by the average consumer, as that of the gas-range; in fact, it would seem that the public have not had sufficient demonstration, for the Committee find that the consumer has more objections to offer than praise to give. About the only advantage cited is the fact that any quantity of hot water may be had any time it is needed. In nearly every case, however, the consumer believes he is paying a high price for this service.

Since but few gas companies keep accurate records of the number of gas appliances of each kind, illuminating and fuel, connected to their lines of main, and since it is impossible to determine between gas used for lighting and that used for fuel, the statistics showing the increase in fuel business must necessarily be estimated to a large extent.

From the United States census report of 1910, it is found that the increase in the quantity of gas made between 1904 and 1909 was 38,285,814,000 cubic feet, or 34 per cent. It may be safe to assume that of the total gas made between 40 and 50 per cent. was sold for fuel purposes. From the same source it is found that the increase in the quantity of electricity made between 1902 and 1907 was 3,355,225,622 K.W.-hours, or 133·75 per cent.

The latter statement shows the development of electricity in the lighting and power fields; and it is very probable that all the increase in gas made, and possibly more besides (where the illuminating business is not considered or protected), is due to the domestic and industrial fuel business. In other words, if the fuel business had not been enlarged, and the lighting end had lain dormant, the gas industry as a whole would probably have shown a decrease instead of an increase in gas made. This would seem to be borne out by the fact that between 1904 and 1909 the income from sales and rentals of lamps and appliances increased as follows: In 1909, $7,043,390; in 1904, $4,249,581—increase, $2,793,809, or 65·7 per cent.

At the meeting of the Association in 1910, Mr. W. T. Barbour, the President of the Detroit Stove-Works, read a paper in which he gave some interesting figures comparing the number of coal-stoves and gas-ranges sold each year between 1900 and 1909. He has estimated that during the fourteen years between 1900 and 1913 there were sold 47,163,000 coal-stoves and 7,751,000 gas ranges and heaters—a total of 54,914,000. This means that of all the stoves sold during the fourteen years only 14·11 per cent. consumed gas. The 1910 census report shows that the number of families in the United States in that year was 20,255,555 and 16,187,715 in 1900—an increase of 4,067,840, or 25·13 per cent. The number of coal and gas stoves sold between 1900 and 1910 was: Coal, 38,665,000; gas, 5,083,000—total, 43,748,000. This represents an increase of coal and gas stoves sold of 43,748,000, against an increase of 4,067,840 in the number of families; in other words, the increase in stoves sold was about ten times as great as the increase in the number of families. The sale of gas-consuming stoves increased 5,083,000, against an increase of 4,067,840 in the number of families; in other words, the increase of gas-stoves sold was a little greater than that of the number of families.

According to statistics compiled from Brown's "Directory," it is found that the average yearly consumption per gas-range connected is about 15,000 cubic feet. Therefore, if every family in the United

States in 1910 (20,255,555 families) were along lines of gas-main and could be brought to use gas-ranges, the annual output for fuel purposes would be 303,833,325,000 cubic feet per annum. Figuring this at an average rate of $1 per 1000 cubic feet, it would represent an annual income of $303,833,325. In 1909 the gross income from gas sales in the United States was $138,615,309, of which perhaps 50 per cent., or $69,307,654, was due to fuel sales. This means that there is still about $234,525,671 worth of domestic fuel (range only) business for the gas man to obtain some day.

Gas fuel has only one large competitor—viz , coal ; the minor ones, such as oil, gasoline, &c., are not very active. Electricity is coming to the front, it is true ; but, judging by the cost of producing and selling, and the inefficiency of the apparatus, electric cooking is at present out of the question, except for the wealthy classes. Though the electricity undertaking is proving a strong competitor in the lighting end—its success being measured according to our resistance—we have an enormous field for effort along the lines of domestic fuel appliances. It is quite reasonable to suppose that every family must cook, by one means or another ; and it is therefore the function of the gas man to see why gas is not the means used, if the opportunity is along, or accessible to, his lines of main. The fact that in fourteen years (from 1900 to 1913) there were about 39,412,000 more coal-stoves sold throughout the country than there were gas-ranges should in itself be sufficient to set the gas man to inquire how many were sold where gas could have been furnished.

Further statistics have been compiled by the Committee from Brown's "Directory," showing the increase in the domestic fuel business from 1908 to 1913 in sixty gas companies in New York State, outside New York City. They show that 58 per cent. of the consumers use ranges or cooking appliances of some kind. This leaves 42 per cent. still to be approached in connection with the fuel business. Referring to the statistics, we find that 42 per cent. of the consumers (meters connected) in 1913 represents 126,830, and that the average annual sales per range or stove are 15,365 cubic feet. If these 126,830 consumers could be convinced of the advantages of gas fuel, then the annual consumption would be increased by 126,830 × 15,365 cubic feet or 1,948,742,950 cubic feet—an average for each of the sixty companies of 32,479,049 cubic feet. Figuring this at $1 per 1000 cubic feet, it represents an average of $32,479 added income each year for each company. Assuming 1296 companies, as shown in the 1910 census, the total additional income on this business would be $32,479 × 1296, or $42,092,835.

These figures are, of course, largely estimated ; but the argument used is sound, and at least gives a glimpse of the large undeveloped sources of income from gas fuel, not alone by getting new consumers, with their attendant investment charges, but also by obtaining fuel business from present gas users, without further investment, except perhaps for additional plant capacity, which nearly always draws a good interest, whereas additional service investments frequently draw no interest at all.

GAS ENGINEERING PROGRESS LAST YEAR.

The Engineering Supplement to "The Times" last Friday was devoted mainly to reviews of the progress made in the various branches of engineering and trade in the past year.

The writer of the section on "Gas Engineering" introduced his review with the following remarks : "The events associated with the earlier months of a year which found the industry trudging along with its usual precision, were so overshadowed by later contingencies as to be deprived of the greater part of the importance attached to them at the time of their occurrence. In common with other branches of trade, the gas industry passed through an anxious period of suspense ; but it is permissible to conclude that the worst of the storm has been safely weathered, and that brighter prospects are already coming into view. With the outbreak of hostilities there was every reason to suppose that the supply of raw material would, to say the least of it, be considerably curtailed. So soon, however, as the railways were freed by the completion of the preliminary arrangements of mobilization and the comparative safety of territorial waters was assured, matters began to settle down to more or less normal conditions. Some inconvenience was necessarily to be expected from the restrictions imposed upon all vessels plying between London and the North ; and the dislocation thus caused was directly responsible for the somewhat diminished, but nevertheless adequate, stocks of coal held in reserve by gas companies in the Metropolis. Though, on the whole, the international situation proved unfavourable from the point of view of the industry, it was not without its saving features, insomuch as the restricted supply of coal created a brisk demand for coke when it was most needed, while the clipping of Germany's commercial wings resulted in a generally improved outlook for subsidiary bye-products. As an illustration of the latter fact, sulphate of ammonia may be quoted. Before the declaration of war quotations for this compound ranged around 10 guineas per ton, whereas to-day they show an increase of nearly 30s. per ton, and the market bears a particularly hopeful appearance. Tar, on the other hand, was somewhat disappointing, with the exception of the distillates bearing a relation to the manufactures of explosives—such as trinitrotoluol. The lifelessness of the tar market itself might be chiefly ascribed to the stoppage of export trade to the Continent, large quantities of this product finding their way in normal times to Belgium alone. In addition, the amount for disposal in this country increases every year with the introduction of modern methods for the production of furnace coke."

After some remarks on the calorific standard, the position of coke, coke-fired motor vehicles, and the additional light thrown on carbonization by the proceedings at the annual meeting of the Institution of Gas Engineers, the writer said : "In conclusion, some mention may be made of the lighting restrictions now in force, and their effect upon the industry in general. The multiplicity of uses to which gas has been turned to-day has been responsible for an appreciable levelling-up of the daily load curve, with the result that during the hours of daylight the consumption is little short of that during darkness. As a consequence, the general reduction in lighting has, on an average, accounted for a decrease in consumption of 8 per cent., while in many cases the falling-off has amounted to no more than 5 per cent."

Under the heading "Works and Trades," reports are given from manufacturers. That which refers to the work of the Gas Light and Coke Company in the past year furnishes the following information : "At their Beckton works, they have devoted themselves to the reconstruction of their retort-settings on the horizontal system, and to perfecting their retort-house machinery, both that used for stoking the retorts and that specially adapted to the mechanical handling and storage of coal and coke. The most recent piece of work undertaken consists in remodelling the second of the two largest retort-houses, which, originally fitted with 45 settings, each containing twenty 9-feet retorts, producing 4½ million cubic feet of gas a day, is now fitted with settings of 'vertical tens,' and produces 8 million cubic feet a day."

INDUSTRIAL APPLICATIONS OF GAS IN ROME.

The "Bulletin" of the Italian Gas and Water Association for last December contains an interesting article by Signor Carlo Alberto Traversari, the Inspector of the Anglo-Romano Gas Company, on the various methods of employing gas in industrial operations in Rome. The appliances include a dryer, working at a temperature of 150° C., for enamelling iron ; others, working at 35° to 50° C. for copal and carriage varnishes ; a press for fire gilding ; a water-bath for glue ; gas soldering irons and furnaces to heat ordinary soldering irons, copper, brass blowpipes, &c. ; blowpipes for autogenous welding and cutting metals ; furnaces for enamelling glass, pottery, and plates, and for tempering and colouring steel ; dentists' furnaces and crucibles ; crucibles for melting metals ; gas and air blowpipes ; a gas-forge.

Some of these appliances are supplied by special makers, and others are the result of long study, which made it possible for the Company to apply gas economically and conveniently in various industries with great advantages compared with other fuels previously employed. Long preliminary work was necessary to persuade manufacturers in the industries where it seemed that gas could be profitably utilized as fuel that a proper application of it would be very economical, even though the cost might exceed that of the fuel hitherto used. The greater advantages are generally due to the absence of coal-stores, cost of carriage, loading, unloading, removal of cinders, &c , less space and attention in the case of forges, and suppression of work with the bellows. Finally, gas is cleaner in use in all cases. Moreover, the temperature can be regulated to any degree required much better with gas than with any other fuel.

Signor Traversari considers that the future of the gas industry, in spite of adverse opinions, is very promising. There is, he says, an infinity of uses to which the present sphere of work could be extended, not only by providing many forms of appliances for domestic comfort, but for the special industrial applications to which he draws attention.

Cardiff Gas Company.

The report of the Directors for the year ended Dec. 31 states that an interim dividend of 4½ per cent. per annum on the preference stock and 5 per cent. per annum on the consolidated ordinary stock having been paid for the half year to June 30, the Directors now recommend that a half-year's dividend to Dec. 31 on these stocks be paid at the same rate, all less income-tax. The Directors have to record, with the greatest regret, the death of Colonel H. Oakden Fisher, who, as Director and Chairman, was closely associated with the Company for a period of seventeen years. They have elected Mr. Charles E. Dovey Chairman, and Mr. W. Morgan Lewis Deputy-Chairman. The dislocation of business arising out of the war has affected the returns in regard to coke and other residual products, the export of which continues to be carried on under abnormal conditions. Notwithstanding the curtailment of lighting hours and other restrictions brought about by the present crisis, the Directors have the satisfaction to report that the consumption of gas, especially during the winter months, shows a large increase. The carrying on of business since the outbreak of hostilities has been of increasing difficulty, especially as the season advanced. Happily, however, the Directors were enabled, not only to maintain full ordinary supplies of gas, but also to provide for the extra demand, although over 100 of the Company's regular employees have joined the Colours. Sectional repairs and renewals of the producing plant were carried out early in the year. To meet the constantly increasing demand for gas, carbonizing plant of the latest type has been installed in place of settings no longer serviceable. Additional storage accommodation being necessary, the Directors are providing a large new gasholder and tank, which it is expected will be completed in time for next winter's requirements. The revenue of the year was £235,764, working expenditure £195,834, profit £39,930.

Increase in Price at Walton-on-Thames.—The Directors of the Walton-on-Thames and Weybridge Gas Company are reluctantly compelled, like those of so many other undertakings, to announce that, owing to the enormous rise in the price of coal (brought about by the war), they must increase the price of gas to 3s. 11d. per 1000 cubic feet, from the 1st inst. The previous charge was 3s. 6d. Consumers will join with the Directors in hoping that this rise will not be of long duration.

Melbourne Metropolitan Gas Company.—The London Agents for this Company (Messrs. John Terry and Co.) inform us that they have received a cable advice from their principals that the profits for the half year to Dec. 31 were £114,700. A dividend of 6s. 6d. per share has been declared for the half year, £33,000 has been transferred to the reserve fund, £63,300 has been written off the capital account from the balance brought forward, and £30,000 has been carried forward. It was expected that dividends would be payable in Melbourne on the 1st inst., and that drafts to absentee shareholders would be posted by the first mail thereafter.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

At the meeting of the Edinburgh and Leith Gas Commissioners on Monday, the report submitted by the Treasurer and Collector (Mr. A. Canning Williams) to the Finance and Law Committee showed that the total collections from Whitsunday to the 7th ult. amounted to £188,662, of which £141,915 was gas revenue; being an increase of £1286 on the total received in the corresponding period of 1913-14. He also submitted a statement showing the quantity and value of gas sold during the summer and autumn term of the past year compared with the corresponding period of 1913. The total for the latter period was 778,815,300 cubic feet, against 771,693,200 cubic feet; being a decrease of 7,122,100 cubic feet, or 0·91 per cent. There was a drop of 5,375,400 cubic feet, or 0·92 per cent., in the quantity of gas used by ordinary consumers in Edinburgh and Leith; and for public lamps, 10,165,500 cubic feet, or 25·21 per cent., less was consumed, owing to the reduced lighting. Otherwise there would have been a small increase in the sale of gas. There was a remarkable rise in the quantity of gas used for engines, &c., in the county—1,464,700 cubic feet, or no less than 125·20 per cent.; while for Edinburgh and Leith it was 2,974,100 cubic feet, or 5·49 per cent. The prepayment consumers used 3,563,400 cubic feet, or 8·46 per cent., more gas; and for stair lighting in Leith 7·77 per cent. more was burnt. There was an increase of 17·26 per cent. in the quantity of gas supplied by the Commissioners in bulk in the county. The value of the gas sold was £101,245, compared with £101,912 in the summer and autumn term of 1913; being a decrease of £667. The revenue resulting from the extra price charged to the consumers was £1332, against £1228—an increase of £104. The reports were adopted.

It was recorded in last week's "Notes" that the poll on the question of adopting the Burghs Gas Supply (Scotland) Act, 1876, at Cowdenbeath had resulted in a majority of 555 votes in favour of the proposal. The matter came before the First Division of the Court of Session last Tuesday, on a reclaiming note for the complainers in a note of suspension and interdict for the Cowdenbeath Gas Company, Limited, and James B. Scott, their Manager, against the Provost of Cowdenbeath and the Sheriff of Fife. The parties were at issue on the method to be adopted in taking a poll of the community, in consequence of a remonstrance signed by 20 electors which had been sent to the Town Council against a resolution passed in June last, and confirmed at a meeting in November, in favour of adopting the above-named Act. For the complainers it was contended that the procedure was regulated by the General Police and Improvement (Scotland) Act, 1862, under which the voting was confined to householders—a householder being defined as a male occupier of a house of £4 rent and upwards. Further, the voting was open, and the poll was closed at 4 p.m. The poll in question was taken in terms of the Burghs Police Act, 1892, as amended by the Act of 1893. Under these Acts there was an extended electorate; parliamentary voters and female municipal voters being included along with householders with £4 rent and upwards. Further, the voting was by ballot, and the poll was open from 8 a.m. to 8 p.m. The complainers wished to interdict the Sheriff from registering in the Sheriff Court books the result of the poll. Before the discussion took place on the merits, Counsel for the Provost of Cowdenbeath undertook not to ask the Sheriff to register the result until the question was decided; and in these circumstances the complainers agreed to the prayer of the note directed against the Sheriff being refused. The Court (consisting of the Lord President and Lords Johnston and Skerrington), adhering to the interlocutor of the Lord Ordinary, refused the note, and found the Provost entitled to expenses. The Lord President said section 38 of the Interpretation Act of 1889 appeared to substitute the constituency and the procedure of the Statutes of 1892 and 1893 for what Counsel for the Provost had characterized as the archaic procedure, and also the archaic constituency prescribed by the Statutes of 1862 and 1868. The respondent therefore appeared to have adopted the correct statutory procedure, and he moved the Court to refuse the interdict sought. The other Judges concurred.

In common with the authorities of other cities and towns throughout Scotland, the Corporation of Glasgow have had cause to complain for some time past of a great shortage in the deliveries of coal at the gas-works in fulfilment of current contracts. How serious the position of matters is becoming is shown by a report which Mr. Alexander Wilson, the General Manager of the Gas Department, submitted at a meeting of the Glasgow Corporation Gas Committee yesterday. Mr. Wilson stated that already this winter between 50,000 and 60,000 tons of coal had been taken from stock to make up for the short deliveries from the contractors.

Mr. S. B. Langlands, the Inspector of Lighting and Meters to the Glasgow Corporation, has submitted his report on the work of the meter-testing department for the past year. The total number of meters tested was 31,824, and the amount of fees collected £899 16s. 6d.; compared with 25,918 meters and £748 17s. 6d. fees for 1913. Of the total number of meters tested, 31,289 were new and repaired, and 535 were sent in by gas consumers for certification as to correctness. The work of the department is now carried on in Walls Street by a clerk and two testers; and Mr. Langlands says they are quite able to undertake all the duties. Attached to this report is a table showing the number of each size of meter received and tested, a summary of the results of testing, and an analysis of the faults and errors. The question of the testing of high-pressure meters is engaging the attention of Parliament, and Mr. Langlands is following the matter carefully, and will report upon it in due course. None of these meters have so far been installed in Glasgow, although a high-pressure gas system is at work in the city.

At the forthcoming annual meeting of the Coatbridge Gas Company, the Directors will report that, taking the exceptional circumstances of

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New Types for coming Season. Full particulars will be announced shortly.

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the past year into consideration, the accounts for this period are fairly satisfactory. The total consumption of gas amounted to 234,826,917 cubic feet, which is a slight decrease compared with 1913. There was an addition of 91 to the number of consumers, and 780 to that of the gas appliances hired out during the year. The gas unaccounted for by leakage, &c., was 8·49 per cent. The gross revenue for gas, residual products, &c., amounted to £36,090. The capital expenditure on plant, &c., was £1490; while ample provision was made for the maintenance of works and plant. The Directors recommend the payment of dividends, in accordance with sliding-scale, at the rate of 13 per cent. per annum on the original stock, and 9$\frac{1}{10}$ per cent. per annum on the three issues of £10 shares, less income-tax. They express regret that the continued increase in the cost of coal and other raw materials, and the abnormal fall in the value of residual products such as char and sulphate of ammonia, have made it necessary to increase the rates for gas for all purposes by 3d. per 1000 cubic feet.

Thursday was the last day for lodging petitions against Provisional Orders which are to be dealt with this year. One of these is the Glasgow Corporation Water Order, in which power is sought to include the River Turk in the Loch Katrine area of water supply; and several petitions in opposition to the scheme have been lodged with a view to safeguarding interests involved. The Corporation, however, are in negotiation with the various parties; and there appears to be every prospect of an amicable settlement being come to.

On the afternoon of the 23rd inst., the members of the Glasgow Physical Society paid a visit to the Corporation Lighting Department. Mr. Bruce Murray, the Convener of the Watching and Lighting Committee, in welcoming the members, expressed the great pleasure it gave him to find a scientific public body taking so great an interest in one of the most important departments of the city. Mr. S. B. Langlands, the Lighting Inspector, and his staff took the greatest pains to make the visit interesting.

It is announced that the Irvine and District Water Board have accepted the tender of Messrs. Wilson, Kinmond, and Marr, Limited, of Glasgow, to lay a new main pipe from the Munnoch reservoir to the Greenhead filters, at a cost of £3540. They have also decided to abandon the sand-bed system of filtration in favour of Paterson rapid filters, and have accepted the offer of the Paterson Engineering Company, Limited, to provide the new installation at a cost of £13,175.

Writing with reference to the paragraph in last week's "Notes" [*ante*, p. 213] on the subject of the quality of Greenock gas, Mr. James Macleod, the Corporation Gas Engineer and Manager, points out that the suggestion made by one of the members of the Town Council, at the last monthly meeting, that an expert should be appointed to ascertain if gas of 17-candle power could not be produced at the works, was, as shown by a newspaper report which he encloses, received with laughter. He thinks the omission of this fact from our notice of the matter may possibly give rise to a wrong impression.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 1.

There is a fair amount of inquiry for pitch, both for home and export, but it is practically impossible to arrange for shipments in the present state of the freight market. Creosote continues firm at 4d. to 4$\frac{1}{16}$d. per gallon net, in bulk, at makers' works. Solvent naphtha is in good demand, with little offering, and the value to-day is 1s. 3d. to 1s. 4d. for 90-160, casks free. Benzol for motor purposes is steady at 1s. 2d. per gallon, net at makers' works. Other values are: Pyridine, 8s. 3d. per gallon, in buyers' drums; anthracene, 40-45 per cent., 2$\frac{1}{2}$d. per unit, casks free; 60's crude carbolic acid, about 3s. per gallon net, casks free.

The position of sulphate of ammonia is well maintained; the prompt value, for 25 per cent. quality, being about £13 2s. 6d. per ton, into buyers' bags, at sellers' works, and £12 2s. 6d. per ton on the same terms for the second half of the year.

Tar Products in the Provinces.

Feb. 1.

There is no material alteration in the market for tar products, and prices remain fairly steady. There seems to be a fair amount of benzol offering, though there is no alteration in the value. There is no doubt that the make of this article will considerably increase shortly. Solvent and heavy naphthas are in fair demand, and the prices remain firm. Creosote is fairly steady, though sales are reported at slightly lower figures. Crude carbolic maintains its price.

The average values during the week were: Value of liquid products in one ton of tar, 17s. to 18s. 6d. Benzol, 90 per cent., naked, North, 8$\frac{3}{4}$d. to 9$\frac{1}{4}$d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. to 2s. 4d. Crude naphtha, in bulk, North, 5$\frac{1}{4}$d. to 5$\frac{3}{4}$d. Solvent naphtha, naked, North, 1s. to 1s. 1d. Heavy naphtha, naked, North, 11d. to 1s. Creosote, in bulk, North, 3$\frac{1}{4}$d. to 3$\frac{7}{16}$d. Heavy oils, in bulk, 4d. to 4$\frac{1}{2}$d. Carbolic acid, casks included, 60 per cent., East and West coasts, 2s. 10d. to 3s. Naphthalene, £6 to £11; salts, 65s., bags included. Anthracene, "A" quality, 2d. per unit; "B," nominally $\frac{3}{4}$d.

Sulphate of Ammonia.

LIVERPOOL, *Jan.* 30.

During the past week the tone of the market has been a little quieter, in consequence of the congestion of goods at the ports having interfered with shipments to some countries abroad; but in spite of this values have advanced still further. The closing quotations are £13 12s. 6d. to £13 15s. per ton f.o.b. Hull, £13 15s to £13 17s. 6d. per ton f.o.b. Liverpool, £13 17s. 6d. to £14 per ton f.o.b. Leith, for early shipment.

The "30·40" Series of Gas Cookers.

High Grade Cookers at Low Grade Prices.

GAS is on trial every time a Cooker is fixed. There need be no fear of the verdict if it is a Main. The Main Cooker gives the least amount of trouble to maintain at a satisfactory efficiency and will prove the superiority of gas over any other fuel. Keep to the Main.

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SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Not much new business has been recorded for future delivery, but it is reported that £13 17s. 6d. per ton f.o.b. good port has been paid for February-April, and £13 per ton for July-December, in equal monthly quantities.

Nitrate of Soda.

Owing to the high freights, the price is again dearer, and holders now require 10s. 4½d. per cwt. for ordinary, and 10s. 10½d. for refined quality, on spot.

Sulphate of Ammonia.

From another source it is reported that the market for this article has remained very firm throughout the past week, and there has been a further rise in the value, though one is inclined to think that there is a certain amount of speculation going on at the present moment. Outside London, makes are quoted at £13 to £13 2s. 6d.; Hull, £13 10s. to £13 12s. 6d.; Liverpool, £13 15s. to £13 17s. 6d.; Leith, £13s. 17s. 6d.; Middlesbrough, £13 15s.

COAL TRADE REPORT.

Northern Coal Trade.

There is now a steady demand for coal, with a slightly better tendency in prices for some kinds; but the difficulties in the way of transport are not yet removed. In the steam coal trade, the inquiry is fair. For prompt delivery, from 13s. 6d. to 14s. per ton f.o.b. is quoted for best Northumbrians; while for delivery over the year, up to 14s. 6d. or 14s. 9d. is currently quoted. For second-class steams, 12s. to 12s. 6d. per ton may be stated, and steam smalls are firm at 8s. to 10s. per ton. Work at the collieries is maintained. The number of miners is decreased by the heavy recruiting; but the average output of the men at work is heavier than earlier in the year. Gas coal is steady, and the shipments are better—the number of steamers at work being increased a little. Best Durham gas coals are 12s. 3d. to 12s. 4½d. per ton f.o.b.; second-class kinds are near 11s. to 11s. 3d. per ton; and "Wear Specials" are 13s. per ton f.o.b. The export of gas coals to France and to Italy is full; and on the long home contracts there is now a better delivery, though some of the pits seem to be behind in this respect. There are inquiries for small contracts for gas coal; but buyers hold off, as the tendency of the freight market seems to promise ease. Contracts for coal for the Swedish State Railways have been allotted—chiefly for Durham qualities—and these will stiffen the market. Coke is quiet. Gas coke is plentiful, and from 11s. 8d. to 12s. 6d. per ton f.o.b. is quoted for good makes in the Tyne.

New Issues of Capital.

At the last sale conducted by Messrs. A. & W. Richards at the Mart, Tokenhouse Yard, E.C., four new issues of capital were offered by order of Directors. Some £10 preference shares (6 per cent.) of the Bournemouth Gas and Water Company fetched £12 11s. 3d. to £12 15s. each. An issue of £5000 of consolidated ordinary 5 per cent. stock of the Worthing Gas Company, carrying 5¼ per cent. as from to-day, was sold at £95 to £96 per £100 of stock. Some 4½ per cent. perpetual debenture stock of the Ascot District Gas and Electricity Company fetched £90 per £100; and a few new ordinary £10 shares (7 per cent.) in the same Company, carrying 6 per cent., £10 7s. 6d. to £10 10s. each. An issue of £3000 of ordinary "D" stock of the Broadstairs Gas Company, ranking for a standard dividend of 7 per cent. per annum, subject to the sliding-scale, was all placed at £115 to £121 per £100 *cum div.* as from to-day. The dividends have been paid free of income-tax; so that at the present rate (2s. 6d. in the pound) the distribution is equivalent to 8 per cent. per annum less tax. Some 4 per cent. perpetual debenture stock of the same Company realized £78 per £100.

High-Pressure Gas for Railway Lighting.

New engine-sheds and sidings for the North British Railway Company at the Dunfermline Upper Station have recently been completed; and for the lighting, high-pressure gas, on the Keith and Blackman system, has been again adopted. The installation covers the lighting of the engine-shed, coaling-stage, yard, offices, workshops, and access roads. The yard and road lighting comprises 1000, 600, and 240 candle power outdoor lamps, arranged for upright fixing on steel tubular columns, which have attached to them permanent wrought-iron ladders and platforms for maintenance purposes. The lighting of the engine-shed and coaling-stage is effected by 100-candle power lamps; that of the offices and workshops by 80-candle power pendants. The gas for the installation is supplied by the Corporation under pressure, and is registered through a high-pressure meter; and the control of the lighting is so arranged that the whole installation can be lighted or extinguished from the meter-house, or single lamps or groups can be switched on or off at will. These arrangements are so simple and reliable that they are readily understood by the railway staff. Messrs. A. J. Miller and Co., of Edinburgh and Glasgow, who are factors and erectors for the Keith system, were the contractors for the work; and we are informed that the completed installation, which is an example of ideal railway lighting, is giving every satisfaction.

The Perfection Light Company, Limited, with a capital of £2000, in 40 founders' and 1000 preference shares of £1 each and 3840 ordinary shares of 5s. each, will carry on business as mechanical, gas, electrical, and domestic engineers, and manufacturers of engines, machines, dynamos, lamps, wire, pipes, mantles, and burners.

THE . . .

"Super-Acme"

GAS COOKER.

Where other high-grade Cookers end is the starting point of the "Super-Acme." The "Super-Acme" is not another ordinary Cooker; it is the highest point yet reached in high-grade Gas Cooker Construction.

Emphatically the Ideal Cooker for Hire.

ARDEN HILL & CO.,
ACME WORKS,
ASTON, BIRMINGHAM.

Lurgan Gas-Works Purchase.—The Lurgan Town Council have formally confirmed resolutions for the promotion of a Bill (which has already been deposited in Parliament) to enable them to acquire the local gas-works. The Bill is to empower them to supply gas and to provide for the transfer of the Lurgan Gas Light and Chemical Company, Limited, to the Council; to make further and better provision with regard to the supply of water and electricity; for the improvement, health, local government, and finance of the district; and for other purposes.

Guildford Gas Order.—At the meeting of the Guildford Town Council on Tuesday last, it was reported that the draft Provisional Order applied for by the Gas Company, and the report of the Town Clerk thereon, had been considered by the Lighting Committee, and it was resolved that objections should be lodged with the Board of Trade in respect of a number of matters. The Chairman and the Town Clerk were authorized, if the Company agree, to meet representatives of the Directors to discuss the objections, with a view to the insertion in the Order of the desired amendments.

Pipes and Fittings in the United States.—A report has just been published by the Bureau of Statistics of the American Iron and Steel Institute, giving the approximate production in the United States in 1913 of iron and steel pipe and boiler tubes, &c. The production of cast-iron gas and water and soil and plumbers' pipe and fittings amounted to 1,266,245 net tons, of which 1,002,289 tons were gas and water pipes and fittings and 263,956 tons were soil and plumbers' pipes and fittings. The figures for gas and water pipes include 46,831 tons of fittings. Altogether 67 plants were actively at work, and 34 manufactured cast-iron gas and water pipes and fittings.

Pudsey Gas Company.—The report of the Directors for the year ended Dec. 31 last, which was submitted to the shareholders at their meeting yesterday, stated that the sales of gas showed a slight decrease as compared with the previous year. The returns from residual products were satisfactory—at 80·37 per cent. of the amount paid for coal. Contracts for the supply of coal had been made at a slight reduction upon those of the preceding year. An interim dividend was paid last August at the rate of 9 per cent. on the new consolidated 7 per cent. stock; and the Directors recommended a dividend for the past half year at the same statutory rate.

The Candy Filtration Plant at the Reading Water-Works.—In the course of a review of the past year's work of the Water Committee of the Reading Corporation which recently appeared in a local paper, reference is made to the filtration system in use at the Southcote works, which, it is stated, are still visited by engineers from all parts of the country. The Royal Sanitary Institute of Great Britain have, after six months of close investigation by their judges, conferred their highest award—viz., the silver medal—upon the Candy Filter Company, who are the patentees of the system. Further testimony to its efficiency is that the War Office have recently adopted it for the purification of the water supply to the troops on Salisbury Plain.

Gas Fatality at Liverpool.—A mother and daughter were found dead some days ago at a house in Vauxhall Road, Liverpool; and the Coroner's Jury who inquired into the matter returned a verdict that the deaths were due to coal-gas poisoning. A police-constable said the room was full of gas; and the two women were lying in a natural position, as if they had died in their sleep. As the gas-bracket was rather loose, and the tap could be turned on easily, it was possible that after being turned off the tap had swung round.

Fatal Accident at Saltley.—"Accidental death" was the verdict returned by a Coroner's Jury who inquired into a fatal occurrence at the Saltley works of the Birmingham Gas Department. It appeared from the evidence that deceased, who was a labourer named Greening, was employed in removing pitch from the cooling bed to the store-yard. The platform on which the pitch was being wheeled was 2 ft. 9 in. wide; and it was off this that the man fell into one of the cooling-beds. He had not, however, commenced to wheel when the accident occurred. Greening was at once removed to the hospital, suffering from burns to the hands, face, and head; and he died some days later.

Whitworth Gas Company.—The report for the half year ended Dec 31 shows a profit on revenue account of £634, which, added to the amount brought forward, makes a disposable balance of £1515. Out of this, the Directors recommend a dividend of 7½ per cent. on the original shares and on the amount called up on the "B" shares, less income-tax. The manufacture of gas has cost £1541, compared with £1761 in the corresponding half of 1913; while sales of gas produced £2463, against £2749. Receipts from residual products show a decline—£489, against £673. The total expenditure was £2356, against £2377; and the receipts £2990, against £3470. The Company's capital is now £21,719. The balance to the credit of the reserve fund is £1200.

The Price of Gas at Eastbourne.—A Special Committee of the Eastbourne Town Council have interviewed the Directors of the Gas Company with regard to the intimation that the price of gas is to be increased from 2s. 6d. to 2s. 8d. per 1000 cubic feet, and as to the quality of the gas. The Directors gave the Committee details of the large increase in the cost of coal, amounting at present to 2s. 10d. per ton, which includes an additional 10d. per ton for the carriage from Deptford instead of Newhaven. They further pointed out that the supply would in future come from Erith, which would add 1s. 2d. per ton to the carriage, and that freights had materially increased. They estimate that the additional cost to the Company would be about £8000 per annum. They also pointed out that the dividends would have to be reduced by 5s. per cent., in accordance with the Act. With regard to quality, they suggested that the Corporation and the Company should agree to a standard for heating value. The Committee promised that this matter should receive consideration. The Committee subsequently considered a report of the Borough Surveyor on the subject, and have asked the Directors of the Gas Company to discuss it again.

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Sale of Tottenham Gas Stock.—The £40,000 of "B" stock of the Tottenham District Light, Heat, and Power Company offered for sale by tender on the 19th ult., in accordance with an announcement which appeared in our advertising columns, has been allotted at prices ranging from £112 to £116 per £100 stock. The average price realized was £112 16s. 9d.

Gas Testing at Newmarket.—As the outcome of negotiations regarding the appointment of a gas-tester by the Newmarket Urban District Council, Mr. J. H. Troughton (the Engineer and Manager of the Gas Company) wrote the Council saying that, in the event of them carrying out their proposal to appoint someone "regardless of whether or not the Gas Company agreed," the Company would not be responsible for his fee, neither would they be bound by the result of his test. The Company's only desire, he added, was to have appointed the most experienced expert in gas lighting; while the five gentlemen whose names had been submited to him were all electricians.

Gas-Fires and Fogs.—At a meeting of the Manchester Literary and Philosophical Society last Tuesday, Mr. W. C. Jenkins (of the Godlee Observatory), in a paper entitled "Manchester Fogs of the Last Ten Years," said that of recent years the number of foggy days per month was considerably above the average, except in November and December, which were popularly supposed to be the foggiest months of the year. Professor Gee, in a paper dealing with a similar subject, showed that the percentage of sunshine was almost always highest in May. The President (Mr. Francis Nicholson) thought there was less fog and smoke in the city than there used to be, and attributed this to the increasing use of gas for heating purposes. The Corporation, he urged, might lower the price of gas, to induce people to give up using coal-fires. Mr. Jenkins said there was no doubt that it was the small house-fire which caused most of the smoke fogs to-day; for the heaviest gloom prevailed between 10 and 11 o'clock in the morning, when offices and other fires were being stoked-up.

Doctors and Gas-Fires.—Reference was made at a meeting of the Coventry City Council to the subject of gas-fires, concerning which an interesting statement was made by Mr. T. Quinney (the Chairman of the Gas Committee). Replying to a question, he said that when he presented the last annual report of the Committee a great deal of objection was taken to the obnoxious smells, so termed, arising, it was asserted, from gas-fires. He was pleased to state, however, that a very much better feeling now prevailed than was formerly the case. People who consumed gas were more enlightened as to its use; and in order to convince the medical faculty that gas-fires were, if not absolutely, very nearly, free from obnoxious smells, the Committee sent fires to the medical men of the neighbourhood, and fitted them up, so that they could test for themselves as to whether there was really any nuisance arising from them. He thought that, as the result, they had received unanimously the testimony of the medical men in Coventry that there was no nuisance whatever arising from a gas-fire.

Bilston Gas Company.—At the annual meeting of this Company, in submitting the report and accounts [already noticed in the "JOURNAL"] the Chairman (Mr. Holcroft) said the Company had felt the effects of the war, which had limited their increase in the sales of gas to 2 per cent., instead of 7 or 8 per cent. which it otherwise would have been. The war had also affected them in regard to the disposal of residuals, especially ammonia; and further decreases in this direction were to be anticipated as a result of the new process of obtaining ammonia synthetically from the atmosphere at a price with which no gas company could compete. The shareholders had, however, every reason to congratulate themselves upon the fact of the Company being on a very sound basis. The report and accounts were unanimously adopted; and the dividends recommended were declared.

Gas and Smoke.—In delivering one of a series of Bristol Popular Lectures, Professor J. Wertheimer, D.Sc., dealing with the subject of "Gas *v.* Electricity," alluded to the great decline in the amount of fog in London, and to the increase in the amount of sunshine, which had resulted from the gradual replacement of the coal-fire by the gas-fire; and he mentioned that still larger improvements could be made, if manufacturers were compelled to burn their fuel in a less extravagant manner, and not to allow such large quantities of smoke to escape from their chimneys. After repeating some oft-refuted arguments in favour of electricity, he went on to admit that there is yet room for much development of gas undertakings, since gas is still cheaper to instal, and "in certain" cases cheaper in use. The Professor regards the competition between the two as being beneficial to the consumer, as it has led to continued improvements in apparatus and machinery.

Fatality at the East Greenwich Gas-Works.—An inquiry was recently held at Greenwich, by Mr. H. R. Oswald, into the circumstances attending the death of William Henry Bilding, aged 49, who had been a labourer at the East Greenwich station of the South Metropolitan Gas Company. John Norman, an employee at the works, stated that on the day of the accident he saw Bilding staggering into the coke-hole. He said he had broken his right arm. First aid having been rendered, he was taken to the Seamen's Hospital. Charles Ball, foreman in the retort-house, said that after the accident he examined the gas-engine at which Bilding had been working, and found the driving-belt on the loose pulley, the guard very much bent, the lubricator down, and the gas off. With the exception of Bilding, no one had been at the engine. Charles Harris, engine driver at the works, said Bilding told him he was going to turn down the lubricator when he met with the accident. It was witness's opinion that he caught his arm in the driving-belt and was pressed against the guard. Dr. Lindsay, House Physician at the Seamen's Hospital, deposed that the man died in the institution from fractures of ten ribs on the right side and laceration of the lung. The arm was not broken. The Jury returned a verdict of "Accidental death." The Company were represented by Mr. W. Doig Gibb, the Chief Engineer, and Mr. Washington, who expressed sympathy with the widow, for whom, it was stated, provision would be made.

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Oldham Gas Officials' Salaries.—At the last meeting of the Oldham Gas Committee, on the minutes of the previous meeting coming up for confirmation, exception was taken to a resolution which was recommending an advance of salary to an official. The Chairman (Alderman H. Wilde, J.P.) held that the present time was inopportune for raising salaries; and finally a resolution to rescind the resolution approving of the advance was carried by four votes to three. A general resolution was then passed declaring that no applications for increase of salary would be considered during the present year.

Gas and Coke Prices Reduced at Biddulph.—On the recommendation of the Gas Committee, the Biddulph Town Council have reduced the price of gas from 4s. 8d. to 4s. 6d. per 1000 cubic feet in the case of ordinary consumers, and have decided to allow a discount of 5 per cent. to slot-meter users—the reduction to take effect from the end of the present quarter. The price of coke has also been reduced from 16s. 8d. to 15s. per ton. A circular-letter is to be sent to each householder in the district, pointing out that, now the gas-works have been purchased by the Council, it is in the interests of the inhabitants that the consumption of gas should be extended as much as possible.

Cannock Gas Company.—The eighteenth annual report of the Cannock, Hednesford, and District Gas Company, Limited, has been issued. The receipts on revenue account for the year ending Dec. 31 were £18,320, to which has to be added £680 brought forward. The total expenditure was £14,707, leaving a balance of £4293 to the credit of the profit and loss account. A dividend of 7 per cent. for the year absorbs £3605; leaving a balance of £688 to be carried forward. The gas supplied to private consumers realized £13,652, and for public lighting and under contracts £940. Residual products were sold to the value of £3409. The quantity of gas made was 96,689,000 cubic feet; the total quantity accounted for being 81,609,100 cubic feet.

Sulphate of Ammonia in Russia.—In an article on "The Russian Chemical Trade Situation," in the current number of the "Chemical Trade Journal and Chemical Engineer," the following remarks occur: "In sulphate of ammonia there is a good deal to be done; for the education of the Russian farmer in its favour is a remarkably slow process. He uses some, but not to so large an extent as that of its production in the Donetz basin, where, at the coking batteries, large quantities of ammoniacal liquor are being recovered and mostly converted into sulphate of ammonia. The consumption is so limited, however, that it has to be exported abroad to find a market. It is made a long way from the Baltic provinces, where Western European-made sulphate of ammonia should find a ready and improving sale."

Walker and Wallsend Union Gas Company.—The report of the Directors of this Company for the year ended the 31st of December shows that the revenue was £50,311, and the expenditure £37,728; leaving a balance of £12,583. This added to the balance of undivided profits (£11,560) makes a total of £24,143. The Directors propose to appropriate this as follows: Interest on mortgages, &c., £2925; credit of insurance fund, £500; and dividends of 5 per cent. on the preference stock and 3½ and 5 per cent. on the ordinary stock, £8741—making a total of £12,166, and leaving £11,977 to be carried forward. The revenue account shows a decrease of £1222 in the receipts and an increase of £796 in the expenditure as compared with the year 1913. The Directors report that the increase in the sales of gas still continues; the receipts for the year resulting in an appreciable improvement. On the other hand, coal cost more, while the receipts from residuals decreased all round owing to the fall in values. The capital account for the year shows an expenditure of £1921 more. The mechanical coke-handling plant has been completed and is working satisfactorily.

New Reservoir at Alderley Edge.—On Monday last week, the Chairman of the Water Committee of the Stockport Corporation (Alderman A. Johnston) turned water for the first time into the new reservoir at Alderley Edge. It is the last of the works necessary to utilize fully the Kinder reservoir; and it was inspected by the members of the Institution of Water Engineers on the occasion of their annual meeting last June. It is constructed of reinforced concrete, is circular in shape, and 172 feet in diameter; and the depth of water being 14 feet gives a capacity of 2 million gallons. It is divided into two compartments by means of a dwarf midfeather wall. The water is delivered from the Kinder reservoir into the Jackson's Edge service reservoir at Disley, which is situate 770 feet above Ordnance datum. The water flows by gravitation into the new reservoir along a pipe-line 10½ miles in length. The work has occupied about two years, and has been done by administration. The reservoir was designed by, and the work carried out under the superintendence of, the Water Engineer, Mr. T. Molyneux, Assoc.M.Inst.C.E. After turning on the water, the Chairman heartily congratulated the Engineer on the successful completion of this important work; and the Committee expressed themselves highly satisfied with their inspection.

In September last, the Lambeth Borough Council accepted an offer of the South Metropolitan Gas Company, to bring up to date the lighting installation at the North Lambeth Library. As a consequence of the new arrangements, the consumption of gas for the past quarter was 71,600 cubic feet less than that for the corresponding period in 1913; while, according to a report of the Library Committee on the subject, the lighting is far superior to that given by the former installation.

The fifth of a series of lectures to the staff of the Bradford Corporation Gas Department took place in the Demonstration Room of the new show-rooms last Wednesday week, when Mr. J. H. Singleton, of Messrs. Fletcher, Russell, and Co., Limited, gave an instructive lantern discourse on the "Uses of Gas for Industrial Purposes." This important matter was excellently dealt with; and the slides, showing large and small industrial appliances, evoked considerable interest. In the unavoidable absence of the Engineer and Manager (Mr. Charles Wood), the chair was taken by Mr. S. H. Packer, the Show-Rooms Manager. Mr. C. T. B. Roper voiced the feeling of the meeting in proposing a hearty vote of thanks to Mr. Singleton, who was keenly questioned upon the various industrial appliances which are, or could be, used in Bradford.

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(See "The Lancet," Nov. 14, 1914.)

The Coppée Company (Great Britain), Limited, have appointed Messrs. Scrivener, Breffit, and Co., of Cardiff, their sole agents for South Wales and Monmouthshire.

Messrs. Ashmore, Benson, Pease, and Co., of Stockton-on-Tees, have secured a contract for the supply and erection at the new gas-works, Barrow-in-Furness, of four purifiers, 30 feet square by 6 feet deep, fitted with Pickering's patent connectionless centre-valve, substructure, building, and roof; also for a rotary washer-scrubber, a Livesey washer, and a tar-extractor.

The latest issued pamphlet by Messrs. Stewarts and Lloyds, Limited, of Glasgow, on the subject of steel pipes (a copy of which is just to hand) is devoted mainly to a statement of certain technical matters which they feel are likely to be of interest at the present time. Material, dimensions, joints, cost, corrosion (internal and external), and protective coating—all are dealt with. There are also chapters on "Steel Pipes *v.* Cast-Iron Pipes," and "A Standard Specification for Steel Pipes." The matter is accompanied by a series of exceedingly effective photographs of mainlaying, &c., work being carried out in different parts of the world.

GAS COMPANIES IN THE STOCK EXCHANGE.

Business on the Stock Exchange last week pursued the even tenor of its way without any exciting incident. The general tendency was firm—a tone of cheerfulness being initiated at the opening by the intelligence of our naval success in the North Sea. Later on, the Home Railway market received a fillip from a favourable dividend announcement. But for all this, the number of bargains recorded showed a falling off in the aggregate, and opinions were expressed in some quarters that the minimum prices are too high. This may be all very well from the buyers' point of view, but many possible sellers are holding back in expectation of stronger markets, and activity would scarcely be promoted unless the reduction in the minima were severe enough to scare them—which is not to be thought of. In gas securities, none showed much activity except Gas Light and Coke, the prices of which were slightly higher. In addition to the half-yearly accounts of this Company, those of the South Metropolitan, Commercial, and Tottenham Companies are out. The South Metropolitan will pay a dividend at the rate of £5 4s. per cent. (the full statutory rate authorized with the higher price of gas), while the Commercial and Tottenham—not having raised the price of gas—will pay the same rates as they paid six months ago.

The bargains done for cash during the week were as follows: On Monday, European 13¼, Gas Light ordinary 92½, 92¾, 93, 93¼, ditto preference 92½, 93, ditto debenture 70, Primitiva 5 1/16, ditto preference 4½, 4 9/16, River Plate 85, South Metropolitan debenture 70¼, 71. On Tuesday, Bournemouth debenture 93, 93⅛, 93½, Gas Light ordinary 93, 93¼, 93⅜, ditto maximum 72⅛, 73, Primitiva 4¾, ditto preference 4½, 4 17/32, ditto debenture 85⅛, 86, South Metropolitan debenture 70½, 71, 71¼, South Suburban debenture 107½. On Wednesday, Alliance and Dublin 59, 59¼, Commercial 4 per cent. 99¼, ditto debenture 71¼, Gas Light ordinary 92⅛, 93, 93½, ditto debenture 71, Tottenham "B" 112. On Thursday, Gas Light ordinary 91⅛, 92, 93, ditto debenture 71, Imperial Continental 82, 82¼, 82⅛, 83½, Primitiva 4⅞, ditto preference 4 7/16, 4½. On Friday, Continental Union 70¼, 71, Gas Light ordinary 92¾, 93, 93½, ditto preference 91½, ditto debenture 70. On Saturday, Brighton and Hove ordinary 145, 145½, Gas Light ordinary 93⅜, 93½, ditto preference 91, 92½, South Suburban 108.

Bank rate (fixed Aug. 8) 5 per cent.; last year, 3 per cent.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING JANUARY 30.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59–61	3 18 2	59–59½
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76–79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd.	5⅛–6⅜	5 17 8	..
50,000	10	Feb. 26	16	Bournemouth Gas and Water { 10 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.	29–30	5 6 8	..
378,480	10	,,	7		15–15½	4 10 4	14 7/32–14 9/32
95,000	10	,,	6		13½–14	4 5 9	13½–13¼
—	—	—	—		..	—	93–93½
380,000	Stk.	Feb. 26	14	Brentford Consolidated	261–266	5 5 3	..
330,000	,,	,,	11	Do. New	204–209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref.	109–111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91–93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208–213	5 3 4	..
244,300	,,	,,	8	Do. A Ord. Stk.	154–159	5 0 8	145–145½
530,000	20	Mar. 26	12½	British	44–45	5 11 1	42–42½
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88–90	4 8 11	..
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85–87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1½–2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4–6	—	..
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70–75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	103–110	4 10 11	..
1,513,380	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106–108	5 1 2	99½
560,000	,,	,,	5½	Do. 3½ p.c. do.	103–105	5 1 6	98½
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½–71½	4 3 11	..
800 000	Stk.	,,	4	Continental Union, Ltd.	76–79	5 1 3	70¼–71
200 000	,,	,,	7	Do. 7 p.c. Pref.	115–118	5 18 8	..
—	—	—	—	Croydon B 7 p.c.	..	—	223–224
492,270	Stk.	—	6	Derby Con. Stk.	123–125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk.	102–104	3 16 11	..
1,002,180	10	July 29	10	European, Ltd.	17½–18*	5 11 1	13¼
16,362,910	Stk.	Feb. 12	1/17/4	Gas { 4 p.c. Ord.	98–102	4 15 6	91¼–93½
2,600,000	,,	,,	3½	Light { 3½ p.c. max.	76–79	4 8 7	72½–73
4,062,235	,,	,,	4	and { 4 p.c. Con. Pref.	96–99	4 0 10	91–93
4,674,850	,,	June 11	3	Coke { 3 p.c. Con. Deb.	72½–74½	4 0 6	70–71
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87–89	5 12 4	89–89½
70,000	10	April 29	11	Hongkong & China, Ltd.	16½–16⅞	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	160
131,000	Stk.	Mar. 12	7½†	Ilford A and C	151–154	5 2 4	..
65,780	,,	,,	6⅔†	Do. B	115–118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92–94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental	150–160	5 12 6	82–83½
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84–86	4 1 5	..
200,342	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119–121	5 7 5	..
561,000	Stk.	Feb. 26	10	Liverpool United A	211–213	4 13 11	..
718,100	,,	,,	7	Do. B	146–148	4 14 7	..
806,083	,,	June 26	4	Do. Deb. Stk.	97–99	4 0 10	..
£			p.c.				
75,000	5	June 11	6	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4⅛–4⅜	6 9 9	..
250,000	100	April 1	4½		99–101	4 9 1	..
541,920	20	May 28	4	Monte Video, Ltd.	11½–12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	98½–99½	4 10 6	..
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82–83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14–15	5 2 8	..
300,000	Stk.	May 14	8	Oriental, Ltd.	117–122	6 11 2	117
60,000	5	Mar. 26	10	Ottoman, Ltd.	7⅛–7⅜	6 9 0	..
60,000	50	Feb. 26	13	Portsea, Island B	128–131	4 19 3	..
100,000	50	,,	12	Do. C	118–121	4 19 2	..
249,980	5	April 29	8	Primitiva Ord.	5⅛–6	6 13 4	4⅞–5 1/16
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅝–5	5 0 0	4 7/16–4⅝
521,600	100	June 2	4	,, 4 p.c. Deb.	91–93	4 6 0	85½–86
—	—	—	—		..	—	85
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85–87	4 12 0	85
150,000	10	May 14	6	San Paulo { 6 p.c. Pref.	10¼–11	5 9 1	..
125,000	50	July 1	5	{ 5 p.c. Deb.	47–49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	223–224	4 9 3	..
209,984	,,	,,	10	Do. B	222–224	4 9 3	..
523,500	,,	,,	10	Do. C	220–222	4 10 1	..
90,000	10	May 28	9	South African	10¾–11½	7 16 6	..
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111–113	4 16 8	109–102
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72¾–74½	4 0 6	70½–71½
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157–159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114–116	5 8 5	108
60,000	,,	,,	5	Do. 5 p.c. Pref.	110–112	4 9 3	..
—	—	—	—	Do. West Kent.	..	—	92
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116–118	4 4 9	107½
629,740	Stk.	May 14	5	Southampton Ord.	99–102	4 18 0	..
120,000	Stk.	Feb. 12	7½†	Tottenham { A 5 p.c.	135–138	5 8 8	..
742,275	,,	,,	6†	{ B 3½ p.c.	115–117	5 2 7	112
181,255	,,	June 26	4	District { 4 p.c. Deb.	87–89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5–6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93–95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	103½–109½	4 11 4	..
				Wandsworth, Wimbledon, and Epsom—			
30,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151–156	5 7 4	..
255,636	,,	,,	6⅝	,, B 3½ p.c.	129–134	5 2 7	..
108,075	,,	,,	5/17/3	,, C 3½ p.c.	110–115	5 2 0	..
352,000	,,	,,	6⅜	Wimbledon 5 p.c.	117–122	5 0 5	..
98,000	,,	,,	6⅜	Epsom 5 p.c.	121–126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66–69	4 6 11	..

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

CHEMIST. No. 5984.
WORKING MANAGER. No. 5987.
FOREMAN (CHARGE OF WORKS). Keighley Gas Department. Applications by Feb. 8.
DRAUGHTSMAN. West's Gas Improvement Company, Miles Platting, Manchester.
JUNIOR DRAUGHTSMAN. Saltley Gas-Works, Birmingham.
HEAD AND RENTAL CLERK. Colombo Gas and Water Company, 148, Gresham House, E.C.
CLERK AND COLLECTOR. No. 5986.
FOREMAN. No. 5985.
LEAD BURNER (for India). Koppers Company, 31, Glossop Road, Sheffield.
FITTERS (Engine and Gas). Bath Gas Company.

Appointment Wanted.

SALES MANAGER. No. 5988.

Gas-Works Wanted.

Particulars to "PRINCIPAL," Scripps's Advertising Offices, 13, South Molton Street.

Plant, &c. (Second-Hand), for Sale.

GASHOLDER AND TANK. Musselburgh Gas-Works.

Patent Licence.

OIL OR GAS FIRED STEAM-BOILERS. J. P. O'DONNELL, Palace Chambers, Westminster, S.W.

Meetings.

ANNFIELD PLAIN GAS COMPANY. Tyne and Stanhope Railway Inn, Annfield Plain. Feb. 19. 6 o'clock.
BRENTFORD GAS COMPANY. St. Ermin's Hotel, Westminster. Feb. 12. 2.30 o'clock.

TENDERS FOR

Coal.

MILFORD HAVEN URBAN DISTRICT COUNCIL. Tenders by Feb. 13.

Compressing Plant, &c.

WORKINGTON GAS DEPARTMENT. Tenders by Feb. 16.

Cookers.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 16.

Fire Clay Goods (*see also* Retort Settings).

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 16.
ROCHDALE GAS AND ELECTRICITY DEPARTMENT. Tenders by Feb. 9.

General Stores (Brass Cocks and Fittings, Lime, Sulphuric Acid, Ironmongery).

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 16.
NELSON GAS DEPARTMENT. Tenders by Feb. 9.

Meters.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 16.

Pipes, Valves, &c.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 16.
WORKINGTON GAS DEPARTMENT. Tenders by Feb. 16.